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SIXTH BIENNIAL REPORT  
OF THE  
NORTH CAROLINA  
BOARD OF HEALTH.  
1895-1896.

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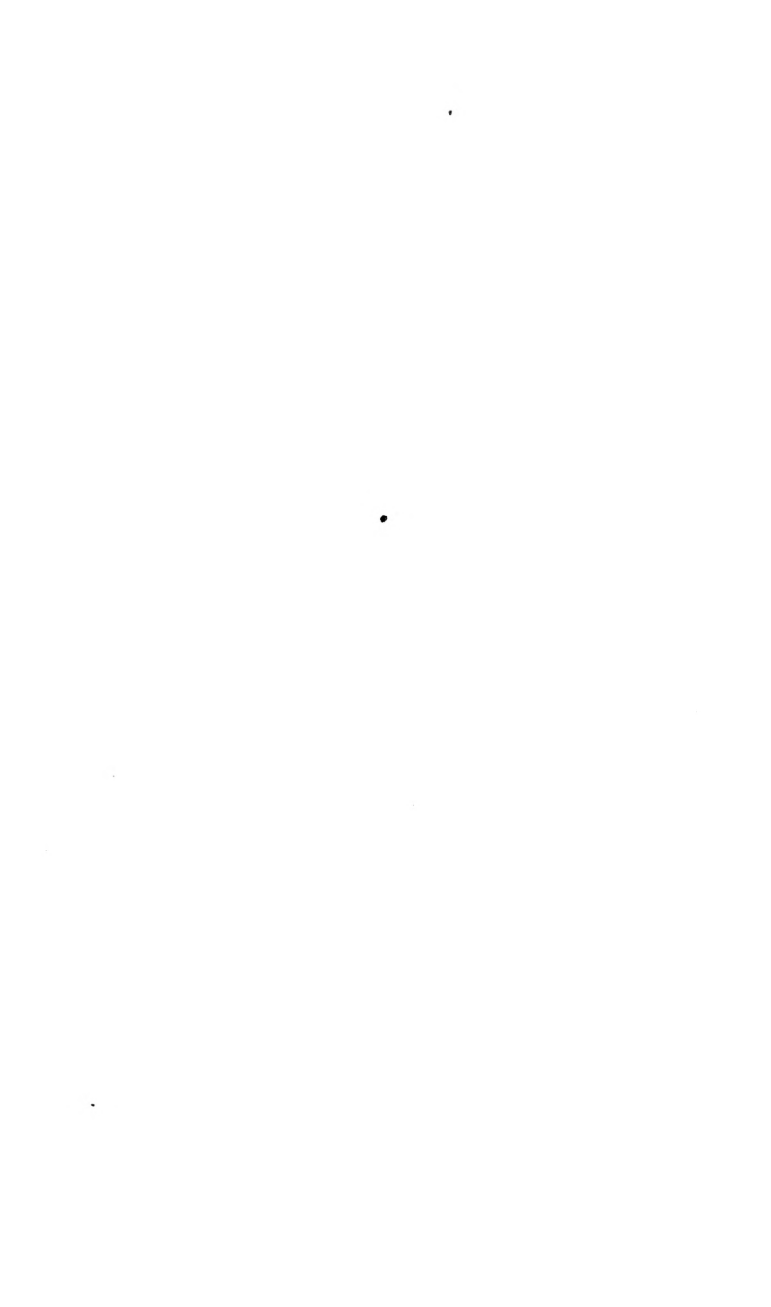
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SIXTH BIENNIAL REPORT

OF THE

NORTH CAROLINA

BOARD OF HEALTH.

1895-1896.

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WINSTON:  
M. I. & J. C. STEWART, PUBLIC PRINTERS AND BINDERS.  
1897.

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## MEMBERS OF THE BOARD.

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### ELECTED BY THE MEDICAL SOCIETY OF THE STATE OF NORTH CAROLINA.

GEORGE GILLETT THOMAS, M. D., President.....Wilmington.  
Term Expires 1897.

S. WESTRAY BATTLE, M. D.....Asheville.  
Term Expires 1897.

W. H. HARRELL, M. D.....Williamston.  
Term Expires 1897.

JOHN WHITEHEAD, M. D.....Salisbury.  
Term Expires 1897.

### APPOINTED BY THE GOVERNOR.

W. P. BEALL, M. D. ....Greensboro.  
Term Expires 1897.

W. J. LUMSDEN, M. D.....Elizabeth City.  
Term Expires 1897.

F. P. VENABLE, PH. D., F. C. S.....Chapel Hill.  
Term Expires 1897.

JOHN C. CHASE, Sanitary Engineer.....Wilmington.  
Term Expires 1897.

RICHARD H. LEWIS, M. D., Secretary.....Raleigh.  
Term Expires 1897.

### STANDING COMMITTEES.

EPIDEMICS—Drs. Lewis and Whitehead.

WATER SUPPLY AND DRAINAGE—Dr. Thomas and Mr. Chase.

HYGIENICS OF PUBLIC SCHOOLS—Drs. Whitehead and Lumsden.

CLIMATOLOGY—Dr. S. W. Battle.

ADULTERATION OF FOOD AND MEDICINES—Prof. F. P. Venable.

SANITARY CONDITION OF STATE INSTITUTIONS—Drs. Harrell  
and Beall.

VITAL STATISTICS—Drs. Lewis, Thomas and Harrell.

LIST OF COUNTY SUPERINTENDENTS OF HEALTH IN  
THE STATE OF NORTH CAROLINA, DECEMBER 31, 1896.

ALAMANCE—Dr. R. A. Freeman, Burlington.  
ALEXANDER—Dr. T. F. Stevenson, Taylorsville.  
ALLEGHANY—Dr. Robert Thompson, Sparta.  
ANSON—Dr. E. S. Ashe, Wadesboro.  
ASHE—Dr. L. C. Gentry, Jefferson.  
BEAUFORT—Dr. Joshua Tayloe, Washington.  
BERTIE—Dr. H. V. Dunstan, Windsor.  
BLADEN—Dr. Newton Robinson, Elizabethtown.  
BRUNSWICK—Dr. D. I. Watson, Southport.  
BUNCOMBE—Dr. E. C. Starnes, Asheville.  
BURKE—Dr. J. L. Laxton, Morganton.  
CABARRUS—Dr. Robert S. Young, Concord.  
CALDWELL—Dr. A. A. Kent, Lenoir.  
CAMDEN—  
CARTERET—Dr. George N. Ennet, Beaufort.  
CASWELL—Dr. W. O. Spencer, Yanceyville.  
CATAWBA—Dr. D. McD. Yount, Newton.  
CHATHAM—Dr. J. Baxter Matthews, Pittsboro.  
CHEROKEE—Dr. J. F. Abernathy, Murphy.  
CHOWAN—Dr. R. H. Winborne, Rockyhook.  
CLAY—Dr. W. E. Sanderson, Hayesville.  
CLEVELAND—Dr. O. P. Gardner, Shelby.  
COLUMBUS—Dr. I. Jackson, Whiteville.  
CRAVEN—Dr. J. W. Duguid, Newbern.  
CUMBERLAND—Dr. J. Vance McGougan, Fayetteville.  
CURRITUCK—  
DARE—Dr. W. B. Fearing, Manteo.  
DAVIDSON—Dr. John Thames, Lexington.  
DAVIE—Dr. James McGuire, Mocksville.  
DUPLIN—Dr. J. C. Grady, Magnolia.  
DURHAM—Dr. John M. Manning, Durham.  
EDGECOMBE—Dr. L. L. Station, Tarboro.  
FORSYTH—Dr. E. F. Strickland, Bethania.  
FRANKLIN—Dr. E. S. Foster, Louisburg.  
GASTON—Dr. J. H. Jenkins, Dallas.  
GATES—  
GRAHAM—  
GRANVILLE—Dr. T. L. Booth, Oxford.  
GREENE—Dr. Jos. E. Grimsley, Snow Hill.  
GUILFORD—Dr. W. J. Richardson, Greensboro.

HALIFAX—Dr. I. E. Green, Weldon.  
HARNETT—  
HAYWOOD—Dr. J. Howell Way, Waynesville.  
HENDERSON—  
HERTFORD—Dr. John W. Tayloe, Union.  
HYDE—  
IREDELL—Dr. W. J. Hill, Statesville.  
JACKSON—Dr. W. F. Tompkins, Webster.  
JOHNSTON—Dr. R. J. Noble, Selma.  
JONES—  
LENOIR—Dr. James W. Parrott, Kinston.  
LINCOLN—Dr. Thomas F. Costner, Lincolnton.  
MACON—Dr. S. H. Lyle, Franklin.  
MADISON—Dr. James K. Hardwicke, Marshall.  
MARTIN—Dr. W. H. Harrell, Williamston.  
MCDOWELL—Dr. George I. White, Marion.  
MECKLENBURG—Dr. H. M. Wilder, Charlotte.  
MITCHELL—Dr. C. E. Smith, Bakersville.  
MONTGOMERY—Dr. W. A. Simmons, Troy.  
MOORE—Dr. Gilbert McLeod, Carthage.  
NASH—Dr. J. J. Mann, Nashville.  
NEW HAMPSHIRE—Dr. J. C. Shepard, Wilmington.  
NORTHAMPTON—Dr. H. W. Lewis, Jackson.  
ONTSLOW—Dr. E. L. Cox, Jacksonville.  
ORANGE—Dr. D. C. Parris, Hillsboro.  
PAMLICO—  
PASQUOTANK—Dr. J. E. Wood, Elizabeth City.  
PENDER—Dr. George F. Lucas, Currie.  
PERQUIMANS—Dr. C. C. Winslow, Winfall.  
PERSON—Dr. J. A. Wise, Roxboro.  
PITT—Dr. Frank W. Brown, Greenville.  
POLK—Dr. C. J. Kenworthy, Tryon.  
RANDOLPH—Dr. T. T. Ferree, Ashboro.  
RICHMOND—Dr. W. H. Steele, Rockingham.  
ROBESON—Dr. T. A. Norment, Jr., Lumberton.  
ROCKINGHAM—Dr. D. W. Courts, Reidsville.  
ROWAN—Dr. John Whitehead, Salisbury.  
RUTHERFORD—Dr. E. B. Harris, Rutherfordton.  
SAMPSON—Dr. John A. Stevens, Clinton.  
STANLY—Dr. D. P. Whitley, Millingport.  
STOKES—Dr. W. L. McCanless, Danbury.  
SURRY—Dr. John R. Woltz, Dobson.  
SWAIN—Dr. A. M. Bennett, Bryson City.  
TRANSYLVANIA—Dr. M. M. King, Brevard.  
TYRRELL—Dr. B. W. Cohn, Columbia.

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UNION—Dr. J. E. Ashcraft, Monroe.

VANCE—Dr. J. H. Tucker, Henderson.

WAKE—Dr. P. E. Hines, Raleigh.

WARREN—Dr. Geo. A. Foote, Warrenton.

WASHINGTON—

WATAUGA—Dr. W. B. Councill, Boone.

WAYNE—Dr. W. J. Jones, Jr., Goldsboro.

WILKES—Dr. J. M. Turner, Wilkesboro.

WILSON—Dr. Nathan Anderson, Wilson.

YADKIN—Dr. T. R. Harding, Yadkinville.

YANCEY—Dr. J. L. Ray, Burnsville.

## LETTER OF TRANSMISSION.

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NORTH CAROLINA BOARD OF HEALTH,

OFFICE OF THE SECRETARY,

RALEIGH, N. C., January 7, 1897.

*His Excellency* ELIAS CARR,

*Governor of North Carolina,*

SIR:—In accordance with Section 3, Chapter 214, Laws of 1893, I have the honor to present this the Sixth Bien-nial Report of the North Carolina Board of Health.

With great respect,

Your obedient servant,

RICHARD H. LEWIS, M. D.,

*Secretary and Treasurer.*



SIXTH BIENNIAL REPORT  
OF THE  
NORTH CAROLINA BOARD OF HEALTH.  
1895 1896.

During the past biennial period the State has been greatly blessed in its escape from any serious or widespread epidemic of disease. As an illustration we cite the fact that not a single case of small-pox has occurred within our borders, notwithstanding its prevalence in many widely scattered localities in the United States. We deserve no credit for this, however, for unfortunately the people as a whole are most discouragingly indifferent to the importance of vaccination. As a consequence thousands—hundreds of thousands, we may say—of our people are unprotected and present a rich harvest for that particular messenger of death, should it come to us, as it may at any hour, and in the course of time surely will. But the Board of Health is powerless, beyond offering advice, which in the absence of imminent danger goes unheeded, for the reason that under the law it has only advisory powers and cannot compel obedience to the plainest and most urgent sanitary rules. Owing to this want of power our work has been for the last two years, as in the past, chiefly educational. Our efforts have been directed to instructing the people in the principles of hygiene and impressing upon them the importance and value, looked at from the money point of view as well as from that of life and comfort, of a proper observance of

the rules of health. This work has been accomplished through the instrumentality of letters from the Secretary in particular cases, the *Monthly Bulletin*, health conferences, and the distribution of health pamphlets. Two "health conferences with the people" have been held since our last report, one at Washington on the 16th of November, 1895, and the other at Charlotte on October 15, 1896. These were well attended, especially the former, at which people were turned away for want of room. Much interest in the proceedings, which consisted of the reading of papers, by members of the Board and others invited by the Board, of a popular character on practical subjects, the discussion of the matters thus brought forward and questions by individuals in the audience. Nearly 30,000 each of three health pamphlets and 20,000 of another have been distributed. By these means sanitary seed have been sown broadcast from Cherokee to Currituck, and although many fell by the wayside or on stony ground or among thorns, some have fallen on good ground and brought forth fruit. While we cannot claim to have yet secured a good "stand" the field grows greener with each succeeding year and the prospect of a harvest more encouraging.

A detailed statement of the work of the Board since our last report will be found in the following pages.

## MEETINGS OF THE BOARD.

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### CALLED MEETING AT RALEIGH,

January 29, 1895.

In the absence of a quorum an informal consultation by the three members present, viz.: Drs. Thomas, Harrell and Venable, besides the Secretary, was held with the last named in regard to sanitary legislation by the General Assembly then in session.

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### MINUTES OF THE ANNUAL MEETING AT GOLDSBORO, IN 1895.

GOLDSBORO, N. C., May 15, 1895.

The Board met in annual session. Present, President Thomas, Drs. Harrell and Venable, and the Secretary. The minutes of the last meeting were read and approved.

The term of the President having expired, Dr. George Gillett Thomas was unanimously re-elected.

Upon invitation Drs. Albert Anderson and W. T. Pate, who had completed the course in practical bacteriology at the laboratory of the United States Marine Hospital service under Passed Assistant Surgeon, J. J. Kinyoun—this privilege having been extended to them by the Board upon the offer of the Marine Hospital service—appeared before the meeting. The question as to the best arrangement to be made between them and the Board in regard to bacteriological examinations was mutually discussed. It was finally decided that they should provide all their

apparatus and that the Board would pay them for work done. They were requested to submit a schedule of charges.

Upon motion the secretary was instructed in view of the absence of a quorum to submit a copy of the proceedings of this meeting to the absent members by letter for their approval or disapproval.

On motion Washington was selected as the place for holding the next health conference in October, the exact date to be set by the President.

On motion two hundred dollars per annum were appropriated for clerical help to the Secretary.

On motion the action of the Secretary in having 10,000 copies of "Instructions for Quarantine and Disinfection" printed for distribution with the other health pamphlets was endorsed.

On motion the Secretary was instructed to have printed in pamphlet form the paper on "Typhoid Fever" read by Dr. A. R. Wilson, of Greensboro, before the Salisbury Health Conference, together with the section of the law bearing on that disease, for general distribution.

On motion the Secretary was authorized to have printed as many copies of the several health pamphlets as in his judgment could be distributed to advantage.

The Treasurer, on motion, was given permission to send his report by mail to the auditing committee, composed of Drs. Venable and Harrell.

On motion the Board adjourned.

RICHARD H. LEWIS,

Secretary.

In compliance with the instructions above given the following letter was sent to all the members of the Board who were not present at the meeting, and their replies unanimously approving the action taken by those present are on file in the Secretary's office.

NORTH CAROLINA BOARD OF HEALTH,  
RALEIGH, October 21, 1895.

DEAR DOCTOR :—At the Goldsboro meeting, on May 15th, it was moved that in view of the fact of a want of a quorum, the Secretary be instructed to submit by letter a copy of these proceedings to the absent members of the Board for their approval or disapproval, in order to make effective any action that may be taken.

Drs. Thomas, Harrell, Venable and the Secretary were present. Anderson and Pate appeared before the Board by invitation, and the best arrangement as to bacteriological work by them for the Board was discussed. It was decided to pay them for the work done, and they were requested to submit to the Board a schedule of charges. Dr. G. G. Thomas was unanimously re-elected President. Washington was selected as the place for the next Health Conference, the date in October to be set by the President. On motion it was ordered that \$200 per annum be appropriated for clerical help to the Secretary. The action of the Secretary in having printed 10,000 copies of instructions for quarantine and disinfection for distribution with the other health pamphlets was approved. He was instructed to have printed for general distribution Dr. A. R. Wilson's paper on "The Importance of Disinfecting the Bowel Discharges in Typhoid Fever." He was also authorized to have printed as many additional copies of all the pamphlets as he might think advisable. The Treasurer was given permission to send his report by mail to the auditing committee, composed of Drs. Harrell and Venable.

Please let me have your report on the above by return mail and oblige.

Yours very truly,

RICH'D H. LEWIS,  
*Secretary.*

MINUTES OF THE MEETING AT WASHINGTON,  
NOVEMBER 6, 1895.

HOTEL NICHOLSON,  
WASHINGTON, N. C., November 6, 1895.

After the adjournment of the Health Conference, which was a pronounced success, the Board met in private session. Present, Drs. Harrell and Venable, Mr. Chase and the Secretary. In the absence of the President Dr. Har-

rell was called to the chair. There being no quorum no formal business was transacted, but a general discussion of future work for the Board was had. Dr. Harrell handed in the Treasurer's report, approved by himself and Dr. Venable, the auditing committee.

RICH'D H. LEWIS,  
*Secretary.*

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### MINUTES OF THE ANNUAL MEETING AT WINSTON IN 1896.

PHOENIX HOTEL, WINSTON, N. C., May 12, 1896.

The annual meeting was called to order by President Thomas. Present, Drs. Thomas, Battle, Harrell, Lumsden, Venable and Lewis—and Dr. P. L. Murphy of the State Hospital by invitation.

On motion the reading of the minutes of the last meeting was postponed.

The question of the best place for the next health conference coming up, Charlotte was selected—the time to be set by the Secretary after conference with the President of the Board and the local physicians.

On motion it was decided to have made during the year, by committees to be appointed by the President, an inspection of all the public institutions and convict camps.

The advisability of quarantining measles was discussed. It was decided that it would be wisest not to attempt to enforce it.

The subject of further distribution of health pamphlets was considered but no action taken.

The care of the incurable insane of the State was likewise discussed at considerable length.

On motion the Board adjourned to meet again to-morrow.

RICHARD H. LEWIS,  
*Secretary.*

PHENIX HOTEL, WINSTON, N. C., May 13, 1896.

Pursuant to adjournment last evening the Board met, with Dr. Harrell presiding, in the temporary absence of the President. The President coming in resumed the chair. Present, Drs. Thomas, Harrell, Whitehead, Venable, Lumsden and Lewis.

On motion another edition of the present health pamphlets, together with Dr. Venable's paper on "Impurities in Drinking Water," Mr. Chase's on "Sanitary Drainage and Disposal of Household Wastes" and the paper on "The Care of the Eyes and Ears," written some years ago at the request of the Board by the present Secretary and stereotyped at that time by the then Secretary, Dr. Wood, of 20,000 or more copies in the discretion of the Secretary, was ordered printed, bound in one volume and distributed.

On motion it was ordered that a chemical and bacteriological examination be made of the public municipal water supplies of the State. Dr. Venable kindly offered to make for the Board one chemical analysis of each supply. The question of having an examination made of the water supplies of the public institutions was discussed, and left for decision to the visiting committees.

On motion Dr. P. L. Murphy, Superintendent of the State Hospital at Morganton, was requested to prepare and read before the proposed health conference at Charlotte a popular article on the importance and best method of caring for the incurable insane of the State.

The Secretary and another member of the Board, to be appointed by the President, were selected as delegates to the annual meeting of the American Public Health Association at Buffalo in September.

Dr. Venable, who was appointed a committee to audit the accounts of the Treasurer, reported them correct.

On motion the Board adjourned to meet at Charlotte.

RICHARD H. LEWIS,  
*Secretary,*

MINUTES OF THE MEETING AT CHARLOTTE  
IN OCTOBER, 1896.

CHARLOTTE, N. C., October 15, 1896.

In one of the intervals between the meetings of the Health Conference a business meeting of the Board was held in the Buford House. All the members, except Dr. Harrell, who was detained at home by sickness in his family, were present. Passed Assistant Surgeon J. J. Kinyonn, of the Marine Hospital Service, and Dr. Murphy, of the State Hospital at Morganton, were also present by invitation.

The Secretary presented the reports of Drs. Anderson and Pate, the bacteriologists of the Board, of their examinations of the water supplies of Asheville, Salisbury, Concord, Greensboro, Salem, Winston, Durham, Raleigh, Henderson, Goldsboro, Wilmington and Newbern, and stated that he had been unable to obtain, up to that time, through the usual channels, proper samples from Charlotte and Fayetteville. He called attention to the fact that five of these supplies were reported as infected with intestinal bacilli and three as being suspicious.

On motion, the Secretary was instructed to have made immediately another bacteriological and chemical examination of all the infected and suspicious waters; and he was further ordered in those cases where the water was shown to be still bad, to notify the Superintendent of Health, the Mayor and the Manager of the Water Works of the fact, and call upon them in the interest of the public health to remedy the trouble, and if he did not receive satisfactory assurances within 30 days that this had been done, to have the analyses published in the local papers for the information of the people using said waters.

An offer to the Board by Dr. R. H. Whitehead, the head of the Medical Department of the State University, to make free of charge the serum diagnosis test for typhoid



fever for physicians desiring it, was presented. On motion, Dr. Whitehead's kind offer was accepted with thanks, and the Secretary authorized to distribute the necessary information among the profession of the State, to make it effective.

A letter from Dr. Munroe, asking that the Engineer of the Board be sent to Davidson College to advise as to the best disposal of the sewage from the new medical building there was read. On motion, Mr. Chase was requested to visit Davidson and give all sanitary advice that might be indicated. He was also requested to make a sanitary inspection of the Orphan Asylum at Oxford.

Resolutions of thanks to Dr. Kinyoun for his interesting address on "Bacteria" to the Conference, and to Dr. Murphy for his excellent paper on the "Care of the Insane," were adopted. On motion, the Secretary was instructed to have 5,000 copies of the latter printed and distributed for the information of the people on this important subject.

On motion, the Board adjourned.

RICH'D H. LEWIS,

*Secretary.*

PROCEEDINGS  
OF THE  
CONJOINT SESSIONS OF THE STATE BOARD OF HEALTH  
WITH THE  
STATE MEDICAL SOCIETY IN 1895 AND 1896.

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THE CONJOINT SESSION AT GOLDSBORO, MAY 15, 1895.

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The Conjoint Session was called to order at 12 o'clock by the President, Dr. Geo. G. Thomas, of Wilmington.

The President stated that the expiration of the terms of Dr. W. H. Harrell, of Williamston, and Dr. John Whitehead, of Salisbury, made it necessary to go into an election for members to fill their places.

Dr. W. H. Harrell, of Williamston, and Dr. John Whitehead, of Salisbury, were unanimously elected to succeed themselves in office.

Dr. R. H. Lewis, the Secretary, read his report.

ANNUAL REPORT OF THE SECRETARY OF THE  
NORTH CAROLINA BOARD OF HEALTH  
FOR THE YEAR 1894-'95.

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The law of the State requires the Secretary of the Board of Health to make biennially to the General Assembly, through the Governor, a report of their work. He is also required by the Board to make to its conjoint session with the State Medical Society an annual report. As the General Assembly and the Society do not meet at the

same time the periods embraced in these reports are not synchronous, and the result is that the biennial report overlaps and includes a large part of the report which is made to you in odd years. In consequence of this fact the report of our work for the period embraced between our last meeting and January 1, 1895, has already been published in the Fifth Biennial Report to the General Assembly, copies of which you will find on the desk of the Secretary of the Society.

Since the first of the current calendar year comparatively little new work has been undertaken. With a Legislature dominated by a new element in our State politics whose attitude towards the public institutions in general, and the Board of Health in particular, was unknown, it was thought to be wisest to pursue a Fidean policy, lest our being too much in evidence might bring disaster upon the labor of years. It is extremely gratifying to be able to say that our fears proved to be entirely groundless. This matter having already been set forth in the Report of the Committee on Legislation no further reference to it is required.

The most successful and in every way encouraging meeting the Board has ever held was that "with the people" at the Salisbury Health Conference in September last. A full account of the proceedings will be found in the appendix to the Biennial Report. Among the papers read on that occasion were, one entitled "Suggestions on the Prevention of Tuberculosis as We Know it Today," by Dr. S. Westray Battle, of the Board, and another on "Drinking Water in its Relation to Malarial Diseases," by the Secretary. These papers were ordered by the Board to be published in pamphlet form for general distribution, and I had 10,000 copies of each printed from the type already set up for the Biennial Report. Feeling that the people needed instruction in regard to the import-

ance of quarantine and disinfection in contagious diseases as well as in the matters of tuberculosis and malaria, and that we should take advantage of the opportunity to widely spread such information at a trifling cost, I took the responsibility of having the same number of "Instructions for Quarantine and Disinfection" reprinted. I began the distribution by sending a set of the pamphlets to all newspapers in the State with the following letter:

DEAR SIR:—I send you by this mail, under separate cover, copies of two pamphlets published by the Board for general distribution entitled "Suggestions on the Prevention of Tuberculosis as we Know it To day," and "Drinking Water in its Relation to Malarial Diseases." If they meet with your approval I would thank you to notice them in your paper, and especially to notify your readers that I would be very glad to send them just as many copies as they will read or agree to distribute among their neighbors. The widest distribution possible of these publications is desired. Anything you can do to help the Board in their work of preventing disease will be highly appreciated by them and by.

Yours very truly,

R. H. LEWIS, M. D., *Secretary.*

Not having access to most of the papers I cannot tell to what extent the request was complied with, but a number containing the desired notice have been sent me, and no doubt many others were equally kind.

In order to extend as much as possible the distribution I prepared and had printed 10,000 copies of a circular letter to our physicians.

With a view to an accurate distribution I returned to the Clerks of Court of all the counties in the State for revision and correction in the lists of registered physicians kindly sent me by them in response to my request two years ago. All have been sent back except thirteen. To every registered physician in the other 83 counties I have mailed a copy of each of the three pamphlets and the circular letter, and will mail them to those in the other thirteen as soon as the lists, for which I have written again,

come in. To all County Superintendents I have sent them in quantity, and also to those who have written for them with a promise to distribute them. In order to insure the thorough dissemination of the information on all the subjects treated of in the three pamphlets I have enclosed in each large package a copy of this circular letter :

DEAR SIR :—I send you a number of copies of “ Prevention of Tuberculosis as we Know it To-day,” “ Drinking Water in its Relation to Malarial Diseases,” “ Instructions for Quarantine and Disinfection,” and circular letter for distribution. As the Board desires to disseminate the information contained in each as widely as possible among the people I would thank you to give to each person a complete set of all four. Although a person may express a desire for only one, give him all of them.

If you find you can distribute more let me know and I will take much pleasure in replenishing your stock. Any efforts to help us in this work would be greatly appreciated by the Board.

Very truly yours,

RICHARD H. LEWIS, M. D., *Secretary*.

That the publications have been received with much favor is evident from the newspaper notices, which some of you have doubtless seen, and still more from the number of applications which I have received for them in response to the circular letter, and the invitation published in many of the newspapers, perhaps all of them. The exact number asked for so far in the applications which give figures is 4,093, varying in quantity from 1 to “ 300 or more.” In addition 22 requests of an indefinite character have come in, such as, for example, “ a few,” “ some,” “ a great many,” “ as many as you may please to send,” “ as many as you can spare,” “ enough to supply the drug stores of Fayetteville,” “ a sufficient quantity for a crowd of a thousand expected at the closing exercises of a school,” etc. The ten thousand have been already nearly exhausted and the present demand has not by any means been supplied. I believe that 50,000 could be scattered through the State with benefit for the education of the

people in these practical sanitary questions. Something on typhoid fever should accompany the publications mentioned above. We already have it in hand in an admirable article on that subject read before the Salisbury Health Conference by Dr. A. R. Wilson, the live and energetic Superintendent of Guilford County, which you will find in the proceedings of that meeting printed in the appendix to the Biennial Report. With the sections of the law especially applying to typhoid fever as an addendum that paper would I am sure do much good. I trust that it may be the pleasure of the Board to order it printed in the same form and sent out with the others hereafter.

If it meet with the approval of the Board it is my intention to send these pamphlets to all the State and County officers, to the professors in all our colleges and high schools, to every lawyer, especially to every preacher, that he may be incited to preach in private to his flock the gospel of physical health, to leading farmers and merchants and to every one who shall ask for them. But after all no class of our citizens can advance the cause of preventive medicine as can our physicians, for the simple reason that they alone can speak *ex cathedra*. It is, however, a very discouraging fact that many are quite indifferent to the claims of this branch of our calling, and I avail myself of the opportunity afforded by this conjoint session to again appeal to you to lend a hand and help to build up in the profession generally a sentiment favorable to the active promotion of that which has in it such potentialities for good to all the people. We have received gratifying assurances from various sources that the work done in the past year has been the most successful in the history of the Board of Health. With the cordial support and active co-operation of the medical men of the State

we can confidently look forward to far greater results. Without it our best directed and most earnest efforts must prove largely barren and unprofitable.

It will be remembered that the U. S. Marine Hospital Service, through Passed Assistant Surgeon J. J. Kinyoun extended an invitation to our Board at the last annual meeting, at Greensboro, to send representatives to Washington for the purpose of receiving free a six weeks course of instruction in practical sanitary biology, in the laboratory of the Service.

I am gratified to report that Dr. Albert Anderson, of Wilson, and Dr. W. T. Pate, of Gibson Station, applied for the privilege, and in January last availed themselves of it. They report a very satisfactory experience, and are now fully equal to the bacteriological examinations called for in practical sanitation. They desire to make some return for the privilege enjoyed through the courtesy of our Board by doing a reasonable amount of work for us without charge. Dr. J. Howell Way, of Waynesville, has recently made application to the Board for an appointment to the Laboratory, and as soon as it may mutually suit the convenience of himself and the Superintendent of the Laboratory it will be given him.

The invitation is open to any member of the Society as long as the offer of the Marine Hospital Service in this matter stands.

#### DISCUSSION.

Dr. Haigh said that in his section of country there had been a great deal of interest taken in sanitation, and especially in regard to the supply of water. Of late years the malarial cases had assumed a more serious form, that of hemorrhagic fever. The simple driven pump is not having the full effect expected, that is, not giving freedom from surface water. He wished all the information he could get upon the subject. He had never seen the peo-

ple take more interest in matters coming from the State Board of Health. He was sure that the profession would help the Board in every way in distributing these tracts.

Dr. Booth was glad that the Board was holding meetings round through the State, and he thought that the Board was doing a great work.

The report of the Secretary was received.

Dr. Geo. H. West presented, through the Secretary, a paper on the "Influence of Water on Malarial Fever." It was read by title and referred.

The Secretary stated that Dr. West reported his experience as a physician to the convict camps on the Roanoke river. He had found a marked difference in the amount of malaria caused from the driven pump and the open well. The desire is to get through the impervious layer of marl and clay: but he had found the malaria very much diminished by wells 25 or 30 feet deep, tho' not through the marl or clay. The Secretary reported a letter he had gotten from Dr. Whitaker, the County Superintendent of Jones county, of Trenton. Dr. Whitaker said in his letter that Trenton was situated on a ridge, with the river on one side and a mill-pond on the other. The people on the ridge rarely ever suffered from malarial troubles, but there was one well on the slope—the people who drank from it suffered very much from malarial diseases. The dam of the pond broke in the spring and was not repaired until the following fall, and the bottom of that pond lay exposed to the suns of that summer on the South side of the town during the entire season, and there was no increase whatever in the amount of malaria in the town. Dr. Whitaker himself and others fished in the little pools without the slightest hesitation and never had any malarial fever. He said that afterwards something got the matter with the mill and the owner turned off the water in order to repair his mill, and the consequence was deep indignation on the



part of the people of Trenton ; but, instead of an increase in the amount of malaria during that August and September, if there was any difference at all, there was less than there was before.

The President reported a series of cases from Jacksonville, N. C., bearing upon this question. The town is practically enclosed by New River ; it is in Onslow county. On the point of this peninsula is situated a large saw-milling plant. These patients (all young men), having been warned of the dangers, had used Apollinaris and other bottled spring waters. All of the water was absolutely protected, but they had frequent and severe attacks of malaria. He suggested to these young men that, in addition to the care they exercised, they insist upon their cook boiling every day the water used in cooking their food that came from a well outside 140 feet deep. It went down through the mud layer and the layer of sand and layer of clay. So far the experiment of boiling the water has done very well. One of the young gentlemen has had occasional outbreak of malaria. There has been no sign of an outbreak among the others since the boiling began.

Dr. O. McMullan said that he had read Dr. Lewis' pamphlet. His experience ran back some twelve years or more in the eastern part of the country, and it went to show that malarial troubles were greatly diminished in 1884 and 1885, when there were very little. Frequently through whole years only four or five cases are heard of. The people all improved when the open wells and springs were first substituted by driven pumps ; but the chills are all coming back again. In the year 1893 there was a decided change, and in the spring the people all over the country began to have chills. He thought that there must be some fallacy in the theory that the water was the cause of the chills and fever.

Dr. Sikes wished to corroborate what had just been said.

In the year 1882 nearly everybody in the hill-country had chills. Then they had no more chills, except a few up and down the border of a swamp, until 1894. They did not have any pumps nor make any change, drinking the same water and exposed to the same causes all the time. Chills come in his country by epidemics.

Dr. Duffy did not wish to detract anything from the importance of a good supply of drinking water, but he did wish to say something in favor of bad air as a possible cause. He related the history of a set of cases that fell under his observation last year. At a place five miles from Newbern, known as Fay's Mill, the pond had become dry, and had been so for several years. A stream of water ran through the bed. A family lived there on the verge of that mill-pond and drank from a spring that ran from a rock. That was the only water they used, and the most malignant case of malarial fever that he saw during that year was in that family. One patient was totally unconscious from having convulsions. Fortunately, he had a supply of Sharp & Dolme's bismuriate of quinine for hypodermic injection, and he recovered. There were a number of cases in that family. While he did not think that the importance of good wells could be exaggerated, still he thought that an eye ought to be kept on bad air also.

Dr. Lewis said that those who had read his pamphlet would bear in mind that he did not commit himself entirely to the water theory, but at the same time it was written from the point of view of an advocate, and that he had deliberately overlooked, so far as he could, any evidence on the other side. He did it because if the people were given any avenue of escape they would take it, and he left out a good deal of evidence on purpose.

He was surprised to note that the word cistern had been left entirely out of the discussion. He was a stronger advocate of the cistern than of the driven well, but failing the cistern he advocated the driven well.

Dr. Lewis was asked if he thought the malarial germ could go seventy-five or eighty feet below the surface.

He said he believed it not impossible for the germ to go down the side of the pipe.

Dr. Pate said that there are other things about the well beside malarial poison. The old bucket and the old sweep system are very frequently the cause of the infection of the water by typhoid fever and other germs. It was almost impossible to get a washerwoman who could not go and wash the poison from her hands into the well by handling the chain or pole after they had been infected by the soiled clothes. He was sure that he had seen cases of typhoid fever arising from that source, and he recommended the bored well to prevent that infection as well as others.

Dr. Haign asked about the reports of health from the different countries. The death-rates of several small places had been so high that they attracted his attention, and he asked if there was any special cause.

Dr. Lewis, in answering, read the reports and explained that the death-rates appearing monthly in the *Bulletin* were merely temporary. Many of the returns were worthless on account of the town authorities not taking proper care to render the reports accurate. In one town there are some 3,500 negroes, and months and months will pass without a single death of a negro reported. That is because the regulations in regard to statistics of deaths are not carried out. The only way to make the statistics accurate is not to allow a dead body to be removed until a death certificate has been signed by a physician or a magistrate. A report under 12 per thousand he considered worthless.

The President did not consider the statistics as worth anything, but could see no way at present to enforce the

laws. Many valuable points could be brought out and very simple certificate. It ought to cover not only the age and race, but the place of birth and how long the person had resided in the place of his death. It would affect the sanitary history of a town very materially. A person coming to a town and dying in a month of something contracted before, affects the death-rate of a town and its sanitary history very injuriously.

That brings up another very important subject—that of acclimatization of foreigners. In looking over the deaths from yellow fever he had noticed that Germans died more rapidly than any others. A great many people died of so-called bilious fever of the type in Wood's Practice. Dr. Guiteras, in studying the nature of the fevers of the South, believed some of these were cases of yellow fever unrecognized, and he says that a large portion of the proof is based upon the fact that newly arrived emigrants died of it.

The Conjoint Session then adjourned.

GEO. GILLETT THOMAS, M. D., *President*.

RICHARD H. LEWIS, M. D., *Secretary*.

## CONJOINT SESSION AT WINSTON, MAY 63, 1896.

The Conjoint Session was called to order by Dr. Geo. Gillett Thomas, President of the Board of Health.

At the first order of business the session listened to the following address of the President :

The cause of preventive medicine, which we represent, is receiving everywhere the increasing support of the laity and the law-makers ; and it behooves us, therefore, to carefully consider all the problems that the session may present to us.

Men of thought and genuine public spirit, men who are not politicians from any selfish motive save the laudable ambition of helping and being accounted as promoting all measures that will bring the greatest good to the greatest number. Men of scientific attainments, not the mere scholar and student, but men possessed of knowledge that they can and do turn to a practical use, all men of great worth and close observation are flocking to the aid of the sanitarians.

In proof of this the meeting of the American Public Health Association is largely composed of laymen, but they are just as much interested and in earnest as the professional men, and the quota of the work which these lay members furnish is just as important and impressive as that sent in by the members of our medical profession. We feel, therefore, that we ought to seriously ask ourselves if we each and every one are doing all in our power to aid in the work of the Board of Health of this State.

During the year just ended, your Board of Health has been less conspicuously employed than in former years,

but they have been none the less active. Under the skillful guidance of their most efficient Secretary, Dr. R. H. Lewis, the work has become more and more systematized, and the only flaws of importance in the laws at the present are the want of more mandatory powers, and more money to effect the execution of the orders of the Board.

The health meeting at Washington, one of the missionary sanitary conventions, of the purpose and scope of which you were apprised last year, was a marked success, and is bearing legitimate fruit right now. These meetings will be repeated just as often as possible. It must be remembered that the personnel of the Board is composed of active practitioners and laymen who are always intensely engaged. Due consideration for the life work of these men must be had always in projecting and carrying into effect one of these meetings. There is no doubt that the examination of drinking water here and there all over the State, examinations made to clear up the history of outbreaks of disease, has opened the eyes of the people to the necessity of more care in the provision of the water they use. Coupled with this is the work of Dr. Lewis in the study of the connection of malaria with drinking water. It is quite impossible to measure the extent of good that is the outcome of his earnest labors in this field. I know of a certainty that it has impressed people who have never heard of or read his excellent monograph, but have come into possession of the facts which he so admirably set forth. Those of you who saw the exhaustive report of Dr. Pate on the sample of water sent to him from Wilmington, and the clear connection that his examination established between the drinking water used at a gathering of young people and certain cases of typhoid fever occurring among them, will realize of how much importance this new departure of the Board of Health is worth.

I believe that it is a fact that typhoid fever, that deadly

scourge, is a preventable disease, and that gradually it will be so environed by preventive measures that it will be stamped out. This hope and belief is no doubt to be realized in a future more or less distant, but it is a well founded hope never the less. Tuberculosis, the great rival of enteric fever, will also be controlled, and materially lessened, or be made to vanish, as the laws for its control are gradually evolved from the study and efforts of the sanitarians. These are not vain hopes or utopian dreams. Cholera has been controlled, yellow fever has been stopped at the border, small pox is isolated and checked by vaccination, and these are the work of health authorities.

There is a subject worthy of your serious consideration both as citizens and physicians. There are, as many, I might say all, of you know, a large class of insane people who are classed as incurable, and on account of their mental troubles they are in some of the counties gathering in the alms house—in others confined in jails, and in all of the counties a large number of them go about at large, constituting a menace to the communities in which they live, as well as often imposing a burden upon the household that is really unable to care for them. It is safe to say that no insane person, no matter what the character of the mental aberration may be, is other than a dangerous person and liable to do damage at an unlooked for moment: or in the case of females become the prey of brutal men. This subject was presented to you in Raleigh at the joint session of 1893 by Dr. Hodges, and it is opportune now to revive it. He did not suggest any plan for the relief of these demented that was seized upon. It seems now that something ought to be done, and to elicit discussion and an exchange of opinion, I propose that you consider the propriety of asking the Legislature to provide district asylums for these people. The general asy-

lums are not large enough to accommodate them, nor is there any provision for them in the financial budget of the State. As you meet them in your rides through the city streets or along the county roads, or see them in homes, where they are unwelcome inmates, you often wonder why some sort of law is not enacted, providing for the isolation and care of the poor helpless creatures.

At present, as I have said, they are cared for in some places better than others by the County Commissioners and are pensioners upon the tax-payers. It seems that these demented could be gathered together in groups, as for instance all of the counties in a congressional district sending their pauper insane, who cannot be admitted to the general hospitals at Raleigh, Morganton or Goldsboro, to a hospital to be established at some central point in the district and maintained by the counties comprising this district. If too many counties were in any of these districts other divisions of fewer counties might be made. Provisions for the control and care of these hospitals and the inmates could be made by a general board of control under the guidance of the Commissioners of Charities, assessments to be laid on each county according to the number of inmates sent. This plan would increase the salaried officers of the State and unfortunately would necessitate more political appointments.

This plan or some other should be adopted for the care of these unfortunates, and this would naturally lead up to the establishment of schools for feeble minded children, enabling them to be taught to be of some service to themselves and to the State. This neglect of these stricken people has been too long allowed, and their wrongs and needs cry aloud for redress. We hope to have the matter seriously considered and to present it again until some action is taken.

There is another subject that needs legislation.



The health resorts of the State are growing in number and importance. Those that have risen to the rank and dignity of towns are under some sort of medical and municipal control. But the large majority of these places provide only for summer visitors, and are under no regularly instituted supervision in matters of hygiene. The consequence is that sickness of more or less serious nature is the first thing that arouses these people, the hotel and boarding house keepers, to the necessity for any care for their sanitary surroundings. It would seem, therefore, that any of these resorts where large numbers of our people congregate during the hot months of the year, if there is no responsible health officer to direct matters, that the Board of Health of the State should have the power to interfere in behalf of both the householders and visitors and establish rules and regulations for their safety, with the power also to inflict penalties for violations or neglect.

Let me thank you for your interest in the work which, as your delegated authority, we have been doing and bespeak a continued and increasing interest in the labors of the Board of Health.

Dr. O'Hagan said:—I am sorry to say that in many instances the position of Health Officer in many counties is eagerly sought for and competed for by medical men who have not the honor of the profession at heart nor who duly appreciate its dignity. It has degenerated down into a little miserable petty office which has not been properly remunerated. The suggestion made by Dr. Thomas as to the sanitary control of mineral springs and health resorts is, I think, very timely. I beg to suggest to his consideration and that of the Board that there should be some legislation giving them power to exercise jurisdiction over large boarding schools throughout the State which, I think, in at least one instance that I know of, totally disregarded all sanitary laws. There has been a lamentable neglect

of control of these institutions as to proper feeding, sanitation of building and the surroundings, proper lighting, ventilation, etc. In some I know the pupils have not been properly fed. I know one instance where the water which was used for ice was taken from a pond which was largely contaminated by poultry and other living animals, and large portions of filth, etc., had been piled up during the winter season for the use of the pupils the following season. Sanitation was grossly neglected. Then the lighting of the study rooms was insufficient and unhealthful, and the result was a great prevalence of eye diseases. Whether the present sanitary legislation of the State empowers the Board of Health to pay regular visits I am not aware, but if it does not give power to control these matters to some extent, it certainly ought. As to the care of the insane, I appeal to the members of the Society to interfere in some way or other for the relief of these unfortunates. But even supposing that there was any efficient legislation, I think that there should be an entire change in the methods of providing for the care and sustenance of the unfortunates. We have been spending large sums of money in completing buildings, and if this money were properly distributed it would enable us to take care of twice that number in a more efficient manner. I make these suggestions, that there should be some means by which sanitary visits should be paid to public schools, that it should be made the duty of the superintendents of education (who are generally unfit for the position) that they should insist that the light, ventilation and drinking water should be the best that can be had. In many instances I know the drinking water is not good. I know that the light and ventilation is totally insufficient and prejudicial to study and health. I think that instead of having great central hospitals like those of Goldsboro and the Raleigh Insane Asylum, which would involve an enormous expen-

diture of money, they should be done away with and a building of more humble degree should be erected in each Congressional district, and the expenses would come immediately out of the pockets of the people of that Congressional district, and the one who has charge of this building would be held strictly accountable for the condition of it, and would be directly under the eye of the friends and relatives of the unfortunate inmates.

Dr. Murphy agreed with the President that no insane person could be considered as safe—they are liable to become dangerous at any moment. He explained the condition of the buildings at Morganton, and while the cost per bed at the present time was above \$200 probably, this included the original cost of the grounds and executive buildings. He had mapped out plans whereby additional quarters could be supplied, on the colonization plan, at considerably less than \$100 per bed. He thought it would be more economical and more beneficial to provide room at the existing asylums than provide many separate institutions.

The Secretary, Dr. R. H. Lewis, read his annual report.

## REPORT OF THE SECRETARY OF THE NORTH CAROLINA BOARD OF HEALTH FOR THE YEARS 1895-'96.

The past year has been, I am happy to say, an uneventful one in sanitary matters. No epidemics of disease have occurred, and small-pox, which has prevailed, more or less, over the whole country, has passed us by entirely. Fortunate, indeed, is it that we have escaped such a visitation, for immense numbers of our people remain unvaccinated, and your Secretary frankly admits that he cannot devise any method of materially reducing the number. The only thing that seems to have any effect whatever is the actual or supposed presence of the disease in a community, and whenever a scare is heard of the Superintendent of Health is urged to utilize it to the fullest extent and vaccinate as many as possible.

But while our work has been chiefly routine, I believe it has been the most effective in the history of the Board. It has consisted, in large part, in continuing the distribution (already inaugurated at our last meeting) throughout the state, in various ways, of the health pamphlets with which you are familiar.

In compliance with your instructions, I added to the pamphlets published up to that time the excellent paper read before the Salisbury Health Conference by Dr. A. R. Wilson, of Greensboro, on "The Importance of Disinfecting the Bowel Discharges in Typhoid Fever," supplementing it with the section of the law bearing on that disease, and a short account of the famous Plymouth epidemic. Acting upon the authority given me at our last annual meeting, I had printed 20,000 copies each of these articles: "Prevention of Tuberculosis," "Drinking Water in Its Relation to Malarial Diseases," and "Instructions for

Quarantine and Disinfection," and have distributed nearly all of them. They have been sent to all the newspapers in the State, all the physicians, all the lawyers, nearly all the ministers, white and black, public officials, State, county and municipal, the more prominent teachers, and to numerous individuals whose names were sent to me in response to the circular letter enclosed in every package, asking the reader to send me the name and address of every one he thought would read them. As the Board has very wisely, in my humble opinion, in our present stage of sanitary development, determined to direct its efforts mainly to interesting and educating the people in the principles of preventive medicine and impressing upon them the advantages to be derived from a strict observance of the laws of health; and, as large numbers of our public school teachers, farmers and merchants have not yet seen them, I would respectfully suggest the advisability of printing another edition of at least 20,000 more.

It would be well to supplement the publications named above with the excellent papers on "Impurities in Drinking water" and "Sanitary Drainage and Disposal of Household Wastes," read at the Washington Health Conference by Dr. F. P. Venable and Mr. J. C. Chase, respectively, and perhaps also with the article on "The Care of the Eyes and Ears," as it was stereotyped by my lamented predecessor and the cost of paper and press-work would not be great. Since it is desirable that instruction should be given in all the subjects treated, and as our plan has been to send a complete set to every one, even if he asked for only one, it would be less expensive and more satisfactory in every way to have them all bound together. We can doubtless have the literature intended for the teachers of the public schools distributed by the Superintendent of Public Instruction without cost to the Board, which would mean a very considerable saving in postage.

In this connection you will be interested to know that in September last I received a letter from the Rev. Phillips Verner, of South Carolina, a worthy grandson of the late Charles Phillips, D. D., for so many years the distinguished Professor of Mathematics in our University, who expected to go shortly as a missionary of the Presbyterian Church to the Kassai river country, in the Congo Free State, asking for the publications of our Board on the subject of malaria, and promising to send us the result of his observations and experience in that pestilential valley. If it should turn out that the saving of the life of even one of the noble men who have taken their lives in their hands for God and humanity is accomplished, we might well feel that our labors have not been in vain.

Whether it is attributable directly or indirectly to our stirring of the waters, it is none the less a gratifying fact that a Social Science Club established at Trinity College has taken up the subject of sanitation. The request of its Secretary for any literature we might have was, it goes without saying, gladly honored to the fullest extent of our ability, and our satisfaction was still further deepened by reading in the papers an excellent article on the general subject by Professor Dowd, the President of the Club. It is to be hoped that all our institutions will, as years go by, while not relaxing their efforts for the development of the "*mens sana*," lay more and more stress on the "*corpore sano*," not only by a judicious encouragement of athletics, but by giving instruction as to the means of preventing those ills to which all flesh is heir and before which the strongest athlete, when once in their clutches, is liable to be "downed" forever.

#### HEALTH CONFERENCE AT WASHINGTON.

On November 6th the Second Health Conference with the people was held at Washington. Like the first at Salis-

bury, in September, 1894, it was quite a success. A number of papers were read and discussed. One of these, on "Preventive Medicine," by Dr. J. C. Rodman, was published in the NORTH CAROLINA MEDICAL JOURNAL, and the others, with the exception of Mr. Chase's, on "Sanitary Drainage and Disposal of Household Wastes," have already appeared in the *Bulletin*. This last will be printed in our next issue. The profession of the town and vicinity and the citizens evinced much interest, as was shown by the fact that the hall was filled literally to overflowing, many being turned away for want of room—an occurrence most gratifying and unexpected, for, as we were constrained to say in a notice of the meeting in the *Bulletin* for November: "We never expected to live to see the day when people in North Carolina would be turned away from a health meeting for want of room." Those present still further showed the sincerity of their interest by the questions they asked. While the influence of these meetings does not visibly extend beyond the immediate community where they are held, they do undoubtedly, from assurances to that effect we have received, make a decided impression within those limits. And if we can bring our larger towns to a realization of the importance of sound sanitary laws well administered, we shall surely accomplish great good. In order to extend more rapidly this form of work, it might, perhaps, be well to supplement the conference of the whole Board with the people of the larger cities and towns by having small committees from the Board hold what might be properly called Health Institutes in the smaller places.

#### NATIONAL CONTROL OF SANITARY MATTERS.

The following correspondence on this subject between His Excellency Governor Carr and your Secretary explains itself. It should, however, be stated that an

expression of opinion from the Board, in its corporate capacity being impossible, the views given are merely those of the writer:

STATE OF NORTH CAROLINA, EXECUTIVE DEPARTMENT,

RALEIGH, January 11, 1896.

*Dr. Richard H. Lewis, Secretary North Carolina Board of Health,  
Raleigh, N. C.*

DEAR SIR:—I am instructed by the Governor to enclose you a letter from Joseph F. Edwards, asking for brief expressions on the advisability of a National Code of Sanitary Laws, etc. The Governor would be glad if you will give him your views in regard to this matter.

I have the honor to be, yours very truly,

S. F. TELFAIR,

*Private Secretary.*

NORTH CAROLINA STATE BOARD OF HEALTH,  
OFFICE OF THE SECRETARY, 217 N. Wilmington St.,

RALEIGH, N. C., January 14, 1896.

*His Excellency Governor Carr.*

DEAR SIR:—In replying to your communication enclosing a circular letter from Mr. J. F. Edwards, editor of *The Annals of Hygiene*, and requesting an expression of my views upon the question, "Should we have a comprehensive State or National Code of Sanitary Laws, designed to promote the health of the people, the observance of which should be made compulsory and their infringement made punishable, or should we be satisfied with efforts to educate the people up to the importance of a voluntary observance of sanitary laws? Should we compel or coax obedience to the laws of health propounded therein?" I beg to say:

The State can have no higher duty than the protection of the life and health of its citizens, and it should, therefore, exert all its powers to promote that end, so that in my opinion it should employ both compulsion and education—the latter always and everywhere, and the former whenever practicable. In a city with a well-organized and equipped health bureau, with a strong police force to back it up, sanitary laws might be fairly enforced in the face of an adverse public opinion (until the next election), but in a sparsely settled rural community, like our State, for the most part, any law unsupported by public opinion would be a dead letter. At the same time the very existence of such laws upon the statute books would have an educational influence, and attempts to enforce them would stir up the people, excite interest in, and dis-



cussion of, the subject, and open their minds to the importance of, and need for, such laws. The few that we now have relating to contagious diseases, the contamination of water supplies, etc., have undoubtedly advanced the cause of the public health, although I have never known of a single person being punished for the violation of one of them. This is especially true of our cities and towns.

Our own State Board of Health, having only advisory powers, has devoted itself to the education of the people by the distribution of literature of a practical character, and by holding "health conferences with the people," and I am gratified at the assurance from various quarters that we have made a distinct and favorable impression upon the public mind.

I am opposed, personally and officially, to the interference of the General Government in our local affairs, sanitary or otherwise, except upon request, in times of emergency beyond our power to meet.

With great respect, I am, very truly, yours,

RICHARD H. LEWIS, M. D.,

*Secretary.*

#### VITAL STATISTICS.

Realizing that vital statistics, unless accurate, are practically worthless, and being convinced from the figures that the reports sent in from some of our towns were given incomplete, I made an effort to secure greater accuracy by sending the following circular letter to all the health officers making reports:

NORTH CAROLINA STATE BOARD OF HEALTH,  
OFFICE OF THE SECRETARY, 217 N. Wilmington St.,

RALEIGH, N. C., November 1, 1895.

DEAR SIR:—Vital statistics, to be of any value, must be accurate. The only vital statistics obtainable in our State are the mortuary reports from the cities and towns. Some of these reports bear upon their face evidence of inaccuracy—incompleteness. It is not just to the towns making full reports and giving the real death-rate that they should be placed in the same category with those which do not. I therefore propose, beginning with the December reports, to print in bold-faced type those reports which are vouched for by the officials making them, and to call attention to that fact in a foot-note, so that any one examining the tables may know which are reliable. If you wish your reports to go into the higher class do not fail every month to have their accuracy vouched for by the proper official over his own signature.

I would respectfully call your attention to the fact that reliable mortuary statistics are unattainable in the cities and larger towns otherwise than by a rigid enforcement of an ordinance forbidding, under penalty, the burial or removal of a dead body without an official permit based upon a duly executed death certificate. I enclose model ordinance and sample blanks, that they may be of assistance.

Your cordial co-operation in this matter is earnestly desired.

Very truly yours,

RICHARD H. LEWIS, M. D.,  
*Secretary.*

The certificate printed at the bottom of every mortuary blank that the health officer was required to sign to secure the placing of his town in the list of those regarded as making reliable reports, was this: "I hereby certify that this report gives the *whole* number of deaths occurring within the corporate limits during the above month." Notwithstanding this there are still three or four towns which, for one reason or another, have not complied with this requirement, and have in consequence to be enrolled in the second class. It is to be hoped that this will be remedied. Owing to the fact that we are so largely a rural population our only opportunity to obtain vital statistics is afforded by our towns, and in these days of scientific accuracy mere assertions as to the healthfulness of our State do not satisfy the intelligent inquirer.

#### COUNTY BOARDS OF HEALTH.

It is with much regret that I am compelled to report a discouraging amount of indifference in a good many localities on this subject on the part of the members of the profession. In a number of counties at the regular biennial meeting, on the first Monday of September last, a legal quorum could not be obtained. And this, too, in spite of a circular letter sent with the notice of the meeting (required of me by the law) to every registered physician in the State, calling attention to the decision of

the Attorney General to the effect that no action on the part of the boards would be valid unless a majority of all those eligible to membership participated, and urging upon the readers the importance of selecting their own superintendent of health, and not allowing the privilege to lapse into the hands of the county commissioners. While in many instances the commissioners elected superintendents, in at least one instance that has come to my knowledge they took advantage of the opportunity to give the place to the lowest bidder, thereby reducing the salary, that had been \$250, to \$50, and in others they went still further, and refused to elect any superintendent at all. As a consequence of this the number of counties having superintendents of health has been reduced from 90 to 86. At one time there were 91 counties having superintendents, but in Graham, before the last election, the superintendent left the county and no successor has ever been elected. Camden, Currituck, Hyde, Pamlico and Washington have never organized county boards, notwithstanding repeated efforts on my part to accomplish it. The chairman of the board of commissioners of Pamlico, who was the only one replying, stated that they could not find a physician who would accept the office. Why he did not say, but probably because of the small pay offered in that small county. Since September 1, 1895, for different causes the county superintendent of health has been discontinued in Chatham, Gates, Henderson and Jones. This retrogression, as a fact, is discouraging, but the mental or moral attitude of the authorities towards sanitation and the proper care of the poor and of the prisoners is yet more so. There is only one way to remedy this condition of things, and that is by educating public opinion. As mentioned above, the Board is trying to do this itself, as far as the means at its disposal will allow. But no influence can be brought to bear comparable to that of the

family physician. If the members of the profession would cordially co-operate with the Board and show to their patients an active interest in hygiene and impress upon them the value and importance of its laws, great things could be accomplished. Can we not obtain that help? Are not our medical men, admittedly among the best educated in the country, sufficiently enlightened and humane to lend their interested aid to so grand a cause as the wholesale saving of life? We can but believe that the cause of this indifference on the part of so many—not all, by any means—is simply thoughtlessness—they have never considered the question seriously. We sincerely hope for better things from them. While these discouragements and others press upon us there is no question that the public mind has been appreciably awakened, and that the people of the State, as a whole, are much more interested in, and alive to the importance of, preventive medicine than they were twelve months ago. We have not been standing still.

On motion the conjoint session adjourned.

GEORGE GILLET THOMAS, M. D.,

*President.*

RICHARD H. LEWIS, M. D.,

*Secretary.*

## REPORT ON THE SANITARY CONDITION OF THE STATE AND OTHER INSTITUTIONS.

Owing to the exhaustion of the appropriation made by the General Assembly for the work of the Board, the usual inspection of the convict camps could not be made. All the State institutions proper were, however, visited and inspected, as appears from the particular reports below :

### NORTH CAROLINA INSANE ASYLUM, INSTITUTION FOR THE DEAF, DUMB AND THE BLIND, PENITENTIARY, STATE CAPITOL.

*Dr. George G. Thomas, President of the State Board of Health.*

SIR :—The Committee of the Board of Health appointed to make a sanitary inspection of the North Carolina Insane Asylum, the Institution for the Deaf, Dumb and the Blind, the Penitentiary and the State Capitol, begs leave to submit the following report :

#### NORTH CAROLINA INSANE ASYLUM.

Your Committee was received with every courtesy by Dr. Faison in the absence of the Superintendent, and was shown through every ward in the Asylum. The wards upon the male side were too much crowded, but the additional wing in process of erection will relieve the present wards of this undue strain. The sanitary condition of these wards was otherwise good. The cleanliness, neatness and good ventilation were worthy of note. The water closets flushed well and seemed to be well trapped. Very little odor was noticeable from them. The same was true of the female wards. The arrangements for feeding the patients were neat and wholesome.

The Asylum is excellently located for drainage purposes, and there is no reason why this should not be perfect. The water supply is, however, a point which should receive the careful attention of the authorities of the Asylum. The boring of a deep well which is now in progress may remedy all defects along this line. When completed the water of this well should be carefully examined and its quality determined. The stables, dairy and pig-styes were also visited and found in good condition, and so not at all a source of danger to the Asylum.

#### INSTITUTION FOR THE BLIND—WHITE.

Every opportunity for any inspection of the buildings was afforded your Committee through the kind attention of the Prin

cipal, Mr. Ray. The ventilating arrangements for one of the large sleeping rooms for the boys seemed imperfect. It would be difficult to admit the needed fresh air, where so many were sleeping, without serious drafts, in the present arrangements. The water closet provided for the boys is poorly fitted up, dark and not well ventilated. The boarding up of some of the sinks and washstands is also objectionable. The absence of the proper storage rooms for trunks, &c., is a serious disadvantage with which the Superintendent has to labor, necessitating an overcrowding of the sleeping quarters.

The sewerage system is connected with that of the city. The water supply is also in part the city water. For food purposes the main reliance seems to be placed upon the well immediately in the rear of the building. No examination has been made of this water in the past two years, and the suggestion was made by your Committee that it be carefully examined and periodically watched in the future, as its location makes it liable to contamination at any time. There is a large cistern already constructed. This might be thoroughly cleansed and fresh water caught from the roofs and used in preference to the present supply.

#### INSTITUTION FOR THE DEAF, DUMB AND THE BLIND—COLORED.

The interior arrangements of this building, sleeping rooms, hospital wards, bath-rooms, closets, &c., seemed to be very good. Storage room is, however, needed, and improved furnishings for the outside closets for the boys. The large well, from which much of the water for drinking purposes is taken, is, from its depth, location and proximity to the drains, not above suspicion. It has been recently cleaned out, but its purity has not been tested in some years and should be carefully looked into.

#### THE PENITENTIARY.

Your committee went over the penitentiary buildings under the guidance of Capt. Fleming. Comparatively few convicts were under his charge at the time of our visit. The buildings are in good order and the health of the convicts seems to be well cared for. We think it would be wise to substitute a complete system of water closets, with good sewerage connections, for the present combination of water and earth closets, and also to continue the exit pipe from the drain at least as far as the bed of the creek and not let it empty just outside the wall, as at present. The water used is partially derived from wells. These should be carefully watched and examined. It would seem to be safer to use the water from the large and excellent spring just below the walls.

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## THE STATE CAPITOL.

The plumbing and sanitary arrangements, as far as could be seen, seemed to be good. The building is connected with the city water and sewerage system. The water from the well in the Capitol Square is used by some in preference to the city water.

Respectfully,

S. WESTRAY BATTLE.

F. P. VENABLE.

STATE UNIVERSITY, COLLEGE OF AGRICULTURE AND  
THE MECHANIC ARTS.

November 6, 1896.

*Dr. George H. Thomas, President North Carolina Board of Health.*

DEAR SIR:—Following we give a report of our visits to the public institutions assigned us by the Board.

## THE STATE UNIVERSITY.

We find the general sanitary condition satisfactory. A good number of fixtures of an improved type have been provided, and the sewerage is discharged into a small branch at a proper distance from the buildings.

The water supply, which comes from a large well on the campus, appears to be falling off in quantity, and at the time of our visit the supply was so limited that no use could be made of the baths, and the urinals had very irregular flushing. For the latter fixtures a plentiful supply of water is very essential, and we consider the question of increasing the present supply a vital one.

The present shortness of supply is undoubtedly caused, in a large measure, by the use of several hundred gallons per day by the electric light engines, but be that as it may, the necessity of more water is so evident as to require no argument. An abundant supply can be had from either of two neighboring creeks at a distance of a mile or more from the present center of use.

It is probable that the present supply can be increased sufficiently to answer the purpose for awhile longer by sinking one or two more wells at a distance from the present one, but we are of the opinion that the naturally increasing use will eventually become so large that the supply could not be maintained by wells having such a comparatively small area tributary to them as the ones under consideration.

Should a supply be obtained from one of the creeks before mentioned we should consider it advisable to provide a plant that would be able to supply other consumers as well, which would materially aid in meeting the operating expenses.

We are pleased to note the installation of a well arranged electric lighting plant, which lights the grounds and buildings very efficiently. Also the opening of a "Commons" boarding hall in

the gymnasium building. We desire to testify to the particular cleanliness and attractiveness of everything connected with this establishment, and from personal experience can heartily commend the dietary both in quality and quantity.

#### THE COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

The conditions at this institution are practically the same as when visited by a representative of the Board (Mr. Chase) some two years ago and set forth in his report.

The increased attendance and additional buildings erected emphasize the desirability and necessity of an improvement in the sanitary arrangements, certainly so far as convenience and comfort are concerned. In these days baths and water closets have come to be regarded as necessary adjuncts of our civilization, especially when there is any large aggregation of human beings, and we consider that in this specific instance no reasonable expense should be permitted to debar their installation.

We are aware that the question of sewage disposal has been regarded as a serious if not insuperable obstacle in the way of making a general use of sanitary fixtures. We would by no means advise the discharge of the crude sewage into the small branch that passes through the College grounds, even if there were no prospect of objections being raised by abutters on the stream further down.

We fully believe that the limited amount of sewage to be provided for can be readily disposed of by surface irrigation on the lowest portion of the College tract, near the railroad, and that such disposal will be no more objectionable or detrimental to health than the existing privies and stables.

We do not feel ourselves called upon to go into details regarding the manner of carrying out such a work, that being the province of an engineer, and the nature and gravity of the work would necessarily require the employment of one. Suffice it to say that an object lesson can be had at the State Hospital for the Insane at Columbia, S. C., the sewage of that institution being disposed of in the way above mentioned.

If no change is made in the existing methods we believe that a better type of privy could be provided, and they could certainly be kept in better condition.

The supply of water has lately been increased by means of several driven wells, which yield a fair supply of satisfactory quality. While we are not prepared to say that there is any danger of their becoming contaminated by any pollution of the surface of the ground immediately above them, we do not consider that it is quite in accordance with sanitary teachings to make use of the

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ground about these wells for a cow yard. There is a certain sentiment about such matters that it is well to bear in mind, and it should not be forgotten that the youth who are educated at this institution are likely to be no small factor in assisting to raise the standard of refinement and civilization throughout the State.

Respectfully submitted,

RICHARD H. LEWIS.

JOHN C. CHASE.

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### THE STATE NORMAL AND INDUSTRIAL SCHOOL.

*Dr. George G. Thomas, President State Board of Health, Wilmington, N. C.*

DEAR SIR:—In accordance with your instructions of May 14th, we have visited the State Normal School at Greensboro and conferred with President McIver in regard to the best method of sewage disposal for that institution.

While excreta and general household wastes are occasionally disposed of by cremation in such institutions, we do not deem that method of disposal worthy of consideration in the present instance.

Water carriage is universally admitted to be the best method of removing household wastes and the method of ultimate disposal will depend upon local conditions.

In this particular instance the construction of a pipe sewer some two thousand feet in length would discharge the sewage into a small branch where the danger of its becoming a nuisance would be improbable, at least until the quantity is largely in excess of what it is likely to be in the near future.

As there seems to have been an idea prevailing that this method of disposal might contaminate the city water supply it is proper to say that such fears are unfounded, as the branch into which the sewage will be discharged joins the stream on which the city water works are located below the point where the supply is taken.

We recommend that the branches from the various buildings should be six inches in diameter and the main sewer eight inches: that the minimum grade of the former should be one foot fall in fifty feet, and of the latter one in eighty. Also that an automatic flush-tank be put in, to be operated by the waste water from the laundry, and that provision be made to turn a certain amount of roof water into the drains running from the other buildings.

The best quality of salt-glazed sewer pipe should be used. It should be laid true to line and grade, and all changes in direction.

either lateral or vertical, should be made at angles eased off by slight curves, which are made accessible by manholes. By avoiding the use of long curves and having the sewer straight between the manholes any obstruction can be easily located and removed with the least possible difficulty. Additional manholes should be provided, so that the maximum distance between any two should not exceed four hundred feet.

We consider that the magnitude and importance of this work demand the services of an engineer skilled in such work. We believe that definite data to prospective bidders on the projected work will reduce the cost to an extent that will fully justify the additional outlay and at the same time the future integrity of the work will be assured.

The plans for the new infirmary were submitted for our inspection. The proposed building seems to be well adapted to the purpose for which it is designed and the only suggestion we have to offer is, that the bath tubs should be in separate rooms from the water closets.

Respectfully submitted,

JOHN C. CHASE.

W. P. BEALL, M. D.

WILMINGTON, May 20, 1896.

December 1, 1896.

THE STATE NORMAL AND INDUSTRIAL SCHOOL AND  
THE AGRICULTURAL AND MECHANICAL COLLEGE FOR  
THE COLORED RACE.

*Dr. Geo. G. Thomas, President of North Carolina Board of Health.*

DEAR SIR:—We have visited the State Normal School and the Agricultural and Mechanical College at Greensboro, as instructed by the Board, and submit the following report:

At the first-named institution we find the sanitary condition highly satisfactory. Since last visited by a representative of the Board a sewer has been constructed which discharges the household wastes into a small branch at a point some two thousand feet from the buildings. This sewer was laid in substantial accordance with the advice given by the Engineer of the Board on May 20, 1895, and the work appears to have been done in a first-class manner. We are pleased to learn that the advice of the Board was followed in employing an engineer to design and superintend the construction of the work. Two flush-tanks were put in as recommended, but no provision was made to provide a regular and sufficient supply of water for their operation and the present condition of the sewer shows the effect of the omission. We therefore recommend that the flush-tanks be supplied from the

water works system of the institution, such supply to be so gauged that the tanks will discharge every 24 or 36 hours. We also advise that a small covered catch basin be built at the sewer outlet, designed to retain the solid portion of the sewage, which could be removed and buried from time to time. At the present time this matter is deposited along the sides of the branch and is rather unsightly, although its distance from dwellings would preclude the idea of its being a nuisance, for the present at least. We are inclined to believe, however, that the time will come when it will be found advisable to dispose of the sewage by surface irrigation and an admirable chance can be had at a short distance from the present outfall.

The water supply of the institution for general purposes comes from the city water works. At the time of our visit the supply was shut off on account of repairs to the street main so none of the fixtures could be seen in operation, but the general appearance and arrangement of the plumbing was satisfactory.

Since our last visit a well arranged infirmary has been built, and the only adverse criticism we have to offer is that our suggestion was not followed in regard to placing the water closets and bath tubs in separate rooms. An additional isolated water closet can be very easily provided, however.

At the Agricultural and Mechanical College we find that the water supply in the kitchen comes from the city water supply, but no other fixtures are in use. The only sanitary conveniences are the ordinary box type of privies, which appear to be kept in good condition.

We consider it highly advisable that this institution should be equipped with baths and water closets, not only as a means of comfort and also conducive to health, but on account of the elevating and refining influences that will naturally result.

The sewage of the institution can be very easily disposed of by surface irrigation. The general condition of the grounds and buildings merit commendation.

By invitation of Dr. W. J. Richardson, County Superintendent of Health, we visited the jail in Greensboro. The general condition has recently been somewhat improved by the introduction of water closets, but there is no gainsaying the fact that a new jail of modern construction is imperatively needed. The present structure is a disgrace to the intelligent community which tolerates it, and the fact is so self-evident to any one who may visit it that we do not feel called upon to go into particulars.

In this connection we desire to express our conviction that there should be some restrictions against the overcrowding of jails. In some cases this is caused by using them as places of temporary

detention of Federal prisoners awaiting trial, and the rapacity of the jailer for the resulting profits of boarding the prisoners appears to be the only measure of the capacity of the jail.

Respectfully submitted,

JOHN C. CHASE.

W. P. BEALL.

SCHOOL FOR THE DEAF AND DUMB.

*Board of Directors, School for the Deaf and Dumb,*

*Morganton, N. C.*

GENTLEMEN :—The undersigned, a committee appointed by the State Board of Health to make a sanitary inspection of your institution, beg leave to report as follows :

Desiring to see the institution in its everyday state, we purposely did not notify the Superintendent of the time of our proposed visit. We are very glad to be able to state that we found it in excellent condition. We noted one or two small leaks about the water-closets. We also commented on the wooden block under a bath-tub on the girls' side resting in the channel for the waste water from the shower baths. The position of the tub should be changed, or a support of some material impervious to water substituted for the block of wood.

In a part of the basement and in the bottom of one of the ventilating shafts, we observed an accumulation of litter, which, while not positively dangerous to health, perhaps, was offensive to the sanitary sense.

We called the attention of your wide-awake Superintendent to all these matters, and he informed us that our suggestions would be promptly carried out.

We desire to make our acknowledgements to Superintendent Goodwin for his courteous attentions and for his active assistance in making the inspection.

Very respectfully yours,

GEORGE GILLET T THOMAS.

RICHARD H. LEWIS.

*Committee.*

THE STATE HOSPITAL AT MORGANTON.

*To the Board of Directors of the State Hospital,*

GENTLEMEN :—Under the instruction of the State Board of Health the undersigned visited and inspected the Hospital at Morganton, with special reference to its sanitary condition. It gives us great pleasure to report to the body which we represent and to yours the excellent state of affairs instituted and maintained under your direction for the well-being of the inmates. The

plumbing was everywhere of the best order, and the closets were generally odorless. The only exception existed in the wards occupied by the more violent patients, and the condition in these was only noticeable by comparison with the general cleanliness that existed in every department.

The appointments of every kind in the Hospital and about the property seemed to us to deserve only the most favorable comment, unless we except the provisions for protecting the gangwells in the rear of the barn from the washing of the buildings, which appears to us to be worthy of your attention.

We beg leave to commend the training school for nurses that has been organized by the permission of your Board. It is a most progressive measure and will redound to the good of the Hospital, and in time measurably supply the want of trained persons in the sick room, when these young persons have served their appointed time under the Hospital management.

We trust that the effort to equip a bacteriological laboratory at the Hospital will find favor with your Board. A small beginning has been made, and we submit respectfully that it will, if properly enlarged and put under trained supervision, be of great service to the institution and State at large, especially the Board of Health.

We owe to your Superintendent and his courteous and able assistants many obligations for the aid they willingly rendered us in the performance of our duty, and we esteem it a matter of congratulation that your Board has so wisely chosen the executive officers of the institution you control.

Very respectfully yours,

GEO. GILLET T THOMAS,

RICH'D H. LEWIS,

*Committee.*

THE EASTERN HOSPITAL AT GOLDSBORO.

*To the Board of Directors of the Eastern Hospital.*

GENTLEMEN :—Under the instruction of the Board of Health of North Carolina, I visited the institution which is under your care.

The courteous and capable Superintendent showed me the buildings and the property immediately around them.

The well-directed improvements of the institution were everywhere manifest, and the sanitary condition of the premises, to which I was directed to give especial attention, was excellent.

The property gave evidence of skillful management and unremitting care. The plumbing was all in good condition and the new wards you have erected were of the best modern pattern. The wards were clean and the patients were comfortably provided for and not crowded.

The scheme of the Superintendent to add to his staff a female physician of good standing will commend itself to your judgment.

I desire to tender my thanks to the Superintendent, Dr. Miller, for his pleasant attention and assistance in properly making the inspection.

Very respectfully yours,

GEO. GILLET T THOMAS.

OXFORD ORPHAN ASYLUM.

The water supply comes from some deep-seated springs on the grounds, at a distance of several hundred feet from the main building and is pumped by steam to a metal tank in the attic of the girls' building. The water is apparently of good quality and there appears to be no probable chance of contamination, as proper precautions have been taken to prevent pollution.

The girls' building is supplied with baths and water closets, and the new buildings being erected for the boys will have like conveniences. The present boys' building is not a credit to the institution, and it is gratifying to know that ere long it will be abandoned for the new buildings, which are exceedingly well adapted to the purposes for which they are designed. The plumbing in the girls' building is of a generally satisfactory character, and the same can be said of the plans of that which is proposed for the new buildings.

A new brick building to contain the kitchen and dining-rooms is nearly completed. It is admirably arranged for its prospective uses and will be a great improvement over the present arrangements. Several additional buildings and other improvements are in contemplation, and I am pleased to know that comprehensive location plans were made and lines for water and sewer pipes laid down before any of the work was undertaken. This is so at variance with the general custom in our State that it deserves mention and commendation.

The sewage is discharged through a well-laid pipe into a ditch with a never-failing stream of water several hundred feet from the buildings. I am of the opinion that in due time this method of disposal will have to be abandoned, but there is an excellent opportunity to adopt a scheme of surface irrigation, and as the Superintendent is in accord with this view and has given the matter some study, it can be safely left in his hands.

The surface drainage about the buildings will be excellent after the improvements now in progress are completed, and I see no reason why this institution should not retain its present high rank for healthfulness, which, it is believed, is not excelled in the State, taking everything into consideration.

JOHN C. CHASE.

## INSTITUTIONS OTHER THAN STATE.

## DAVIDSON COLLEGE.

*Dr. George G. Thomas, President N. C. Board of Health.*

DEAR SIR:—I submit the following report of the visit of inspection and advice made, by request, in accordance with the instructions of the Board, to

## DAVIDSON COLLEGE.

for the purpose of advising in regard to the best method of sewage disposal for a new building erected for the medical department.

The general configuration of the grounds and the limited amount of sewage to be provided for indicated that it could be satisfactorily disposed of by discharging it into a small branch several hundred feet from the building.

In the course of time it would perhaps be advisable to make the point of discharge farther down the valley, or if it should seem best it could be used advantageously in surface irrigation near the point first mentioned.

The sewage of the whole institution would most likely be discharged in this direction when sanitary conveniences become available.

The question of obtaining a water supply seems to be paramount at this time and it is not at all clear from whence it can be derived.

It may not be out of place to reiterate the general instructions given in regard to the construction of the proposed sewer. The grade it would apparently have makes a six inch pipe ample for the purpose. It should be of the best quality of salt-glazed pipe and laid true to line and grade. Any change in direction, either lateral or horizontal, should be made at angles connected by slight curves. These curves should be made in manholes, and by having the sewer perfectly straight between them any obstruction can be easily located and removed. Intermediate manholes should be put in whenever necessary, in order that the maximum distance between two adjacent ones shall not exceed 300 to 350 feet. They may be used seldom, if ever, but when they are needed their absence will be found to be a serious inconvenience.

The institution is so advantageously located that it precludes any uneasiness in regard to surface drainage.

Respectfully submitted,

JOHN C. CHASE.

## JOHNSTON COUNTY JAIL.

SELMA, N. C., April 17, 1886.

*Geo. G. Thomas, M. D., President North Carolina Board of Health,  
Wilmington, N. C.*

MY DEAR SIR:—The Board of County Commissioners of Johnston county want to move their jail, and I would like for you to appoint a committee to look out for the health of the prisoners and make suggestions as to the sanitary conditions of the jail. Please notify me and I will meet the committee. Let them meet in Smithfield, Johnston county, any time between now and May 1st. Please let me hear from you at your earliest convenience.

Yours very truly,

R. J. NOBLE,

*Superintendent of Health of Johnston County.*

RALEIGH, April 28, 1896.

*The Board of County Commissioners, Johnston County, N. C.*

GENTLEMEN:—The undersigned, a committee from the State Board of Health, at the request of your Superintendent of Health, Dr. R. J. Noble, visited your county town of Smithfield on Monday, 27th inst., for the purpose of inspecting the present jail and the site on the riverside to which it is proposed to remove the same, and for giving an opinion from a sanitary point of view upon the advisability of such removal. We beg leave to respectfully report as follows:

In company with Dr. Noble and Sheriff Ellington, we carefully inspected the jail. We are much gratified to be able to say that we found it in an excellent sanitary condition—sweet and clean, in spite of the antiquated method of fecal removal by buckets still in use, and a credit to the management of those in charge. Such a desirable state of affairs under similar circumstances, we fear is not common, and we cordially commend the enterprise and humanity of your honorable Board in proposing to put in sewerage and thereby insure, as far as possible, a continuance of the same cleanliness, in that one respect at least, in spite of unfavorable changes of administration that are almost sure to come as time passes. But we think a mistake has been made in substituting mattresses on the floor for the swinging hammocks. They are unsanitary in more than one aspect, and we would respectfully suggest a return to the hammock system, notwithstanding their occasional destruction by the prisoners. The difference in cost would be trifling and they are much preferable. We also think your system of heating could be improved, and at small expense, in the manner set forth below.



The site suggested for the new jail we examined carefully, and we are satisfied that it is a much better one than that now occupied. While nearer the river, we could find no reasonable ground for thinking the danger from malaria any greater, certainly if a sufficient supply of cistern water be provided for the inmates to drink. The cost of a cistern made by utilizing a part of the walls of the basement would be trifling. While a tin-roof would answer, slate would be better and cost only \$2 per square more than the best tin, proving doubtless more economical in the long run. We send you pamphlet on "Drinking Water in Its Relation to Malarial Diseases," in which you will find plans and instructions for building cisterns.

The chief advantage of the new location would be in the short sewer pipe, with rapid fall, located not very far below the surface of the ground. The long sewer, from the present location, with its gradual fall, could not be satisfactorily flushed, owing to the scanty water supply afforded by a 500 gallon tank filled by a hand-force pump, and it would eventually become clogged. To dig up a sewer so deeply buried as that would have to be to obtain the proper fall, in order to find and clear away the obstruction, would be a very expensive piece of work, and one that would almost surely recur. The short, steep sewer could be scoured from end to end daily at an outlay of a comparatively small amount of water, and should any accident happen to it in its course it could be taken up entirely and relaid, if necessary, at a very small cost.

We would respectfully deprecate the plan of merely reproducing the old jail in the new. It seems to us that it would be unworthy of a county that has the present standing and promising outlook possessed by Johnston. In our opinion you would never regret the erection of a more modern structure, in which is provided a separate room for a sick prisoner (which could be utilized also when the jail happened to be overcrowded), and quarters for the jailer—certainly for a guard—who would then always be within call so as to promptly summon aid in case of sudden illness in the night, to say nothing of the effect of such proximity upon the safety and behavior of the prisoners. It is just such little finishing touches as these which show the civilization of a community, and which not only favorably impress the stranger, but elevate the community itself.

Should a new jail be erected, we would respectfully suggest a change in the method of heating and ventilating it. We would recommend that the chimney be built with two flues, having a very thin partition between them—one for the smoke and the other, extending to the floor with a register at the bottom, for taking out the foul air. A jacketed stove with an inlet pipe pass-

ing through the wall should be provided. The fresh, pure air from outside, having been warmed as it passed through the narrow space between the stove and jacket, would rise to the top and force out through the ventilating flue the coldest and foulest air in the room, which always lies next the floor. The air in this flue, being more or less warmed through the thin partition by the hot smoke, would rise and, therefore, draw, making a *pull* upon the foul air in addition to the *push* given it by the warm, fresh air constantly pouring in. The adoption of this method would furnish ideal heating and ventilation at a merely nominal cost.

Expressing our appreciation of the courtesies shown us, we are

Very respectfully yours,

GEO. GILLETT THOMAS,

RICH'D H. LEWIS,

*Committee.*

#### MUNICIPAL WATER SUPPLIES.

At the annual meeting of the Board at Winston the subject of the municipal water supplies of the State was discussed. While the Board realized its inability to accomplish much in the way of assuring the purity of such waters owing to the total lack of mandatory powers in the law covering it and the insufficiency of the appropriation to justify more than the most cursory investigation, it feels that something should be done. It was therefore decided, as appears in the report of the proceedings of the meeting printed above, to have a single examination made of each public water supply, that being as much as it could hope to pay for. This was done for the purpose of informing the water companies that some one was overlooking them, and with the intention, if a supply should be found bad and the company refused after having its attention called to the fact to make at least a reasonable effort to remedy the trouble, to bring the pressure of public opinion to bear upon it by having the results of the investigation, setting forth the character of the water, published in the local newspapers.

In compliance with the order of the Board the Secretary mailed to the respective health officers of the cities

and towns having public water supplies, viz: Asheville, Charlotte, Concord, Durham, Fayetteville, Goldsboro, Greensboro, Henderson, Newbern, Raleigh, Salem, Salisbury, Wilmington, Wilson, and Winston, the following letter:

NORTH CAROLINA BOARD OF HEALTH,  
RALEIGH, N. C., August 15, 1896.

MY DEAR DOCTOR:—The Board has ordered, for its own information, a bacteriological examination made of the public water supplies of all our cities having them. It wishes the sample taken by a medical health officer from a faucet from which drinking water is drawn, and packed and shipped in exact accordance with the directions on the back of the permit herewith enclosed. Accompanying this will be a sterilized bottle.

Please do not fail to take the sample, and pack *immediately* with an abundance of ice and sawdust, as near the departure of the train as possible so as to lose no time in transit.

As the Board proposes to bear all the expense you will not prepay express charges. You can also send bill to me for cost of packing. Your prompt and careful attention to this matter would oblige,

Yours very truly,

RICH'D H. LEWIS, *Secretary*.

Upon the receipt of the report from the bacteriologists, this letter was mailed to the health officers of the cities having infected water:

NORTH CAROLINA BOARD OF HEALTH,  
OFFICE OF THE SECRETARY,  
RALEIGH, N. C., October 6, 1896.

DEAR DOCTOR:—I learn from the duplicate report sent me by Dr. (Anderson or Pate, as the case was) of the bacteriological examination recently made by him, at the request of the Board, of the public water supply of your city, that the water is infected with intestinal bacilli. It is, of course, unnecessary for me to call your attention to the danger to the people of your community of an infection of their water supply of such a character, or to the importance of immediate action on your part in the premises. I would thank you to let me know at once what steps you have taken in the matter, and also what action those in control of your water supply propose to take. As the Board is to meet at Charlotte on the 15th inst., a reply before Wednesday, the 14th, when I must leave for the meeting, would be greatly appreciated.

Very truly yours,

RICH'D H. LEWIS, M. D., *Secretary*.

To this letter only one reply, from Raleigh, was received.

At the meeting of the Board during the Health Conference with the people in Charlotte on October 15th, two months after this letter was mailed, the Secretary stated that he had received from the bacteriologists employed by the Board, Drs. Albert Anderson, of Wilson, and W. T. Pate, of Gibson Station, reports on all the supplies except those of Charlotte and Fayetteville, from which he had up to that time been unable to obtain satisfactory samples. From the reports received (which see below) the waters of Asheville, Concord, Greensboro, Henderson and Raleigh were shown to be infected with intestinal bacilli, and those of Goldsboro, Newbern and Winston suspicious, while the remainder were more or less good.

As the result of this showing the Secretary, as appears in the proceedings of the Board, "was instructed to have made immediately another bacteriological and a chemical examination of all the infected and suspicious waters; and he was further ordered in those cases where the water was shown to be still bad to notify the Superintendent of Health, the Mayor and the manager of the water works of the fact and call upon them in the interest of the public health to remedy the trouble, and, if he did not receive satisfactory assurances within thirty days that this had been done, to have the analysis published in the local papers for the information of the people using said waters.

In obedience to these instructions the following letter was sent to the health officers of the cities having water infected with intestinal bacilli (except Henderson, the report on its water not having been received, at that time) and a special letter in each case to those whose water was reported as being suspicious, which will be found in the particular report on those supplies given further on.

## NORTH CAROLINA BOARD OF HEALTH.

RALEIGH, October 28, 1896.

DEAR DOCTOR:—At a meeting of the Board in Charlotte on the 15th instant I was instructed to have made a second bacteriological as well as a chemical analysis of those water supplies that were reported by the bacteriologists of the Board to be infected with intestinal bacilli or suspicious. As the water of your town comes within that category I send you herewith permits for both analyses and a *sterilized bottle for the sample intended for the bacteriologist*. Be sure not to get the bottles mixed. You will kindly draw the samples from a faucet from which drinking water is taken, *in strict accordance with the directions printed on the back of each permit*, otherwise the analysis would be vitiated and worthless, and ship at once by express at our expense. The sterilized bottle for the bacteriologist should be packed in plenty of ice and sawdust to prevent the increase in the number of bacteria which would surely occur unless the water is kept cold until it reaches him.

Your *prompt* and *careful* attention would oblige,

Yours very truly,

RICHARD H. LEWIS, M. D.

*Secretary.*

In response to this letter, while all of the eight cities and towns having infected or suspicious water sent samples for the second bacteriological examination, only Goldsboro and Henderson complied with the request to send samples also for chemical analysis.

The question of public water supplies for most of our cities and towns in North Carolina is not an easy one. With some exceptions they must in the nature of things get their water from small, short streams, which are fed from cultivated and more or less thickly populated water-sheds. This renders them peculiarly liable to dangerous infection, and extra care and supervision of them is demanded in the interest of the public health. It is so serious a matter that it should not be left to the water companies themselves, most of which are private corporations whose principal stockholders are often non-residents, chiefly interested in dividends. But

even where the works are owned by the city itself the management cannot be counted on as the best always, owing to the influence of political considerations. Legislation giving the State Board of Health, a disinterested body whose only concern is the protection of the health of the people, control of all public water supplies with mandatory powers is urgently called for. What could be accomplished by the Board in this respect, if clad with sufficient authority, can be imagined from the results given below by its work in this direction, imperfect as it is from lack of money and of power. The people have a right to demand that their lawmakers should provide the means for assuring them pure water.

In reading the reports below the correspondence given above should be born in mind.

#### ASHEVILLE.

##### REPORT OF BACTERIOLOGICAL EXAMINATION.

WILSON, N. C., September 28, 1896.

*Dr. E. C. Starnes,*

*Superintendent of Health, Asheville, N. C.*

DEAR DR:—A quantitative bacteriological examination of the sample of water sent me by you from the public water supply in your city shows 5,000 bacteria colonies to the cubic centimetre. Any water containing over 400 colonies to the cubic centimetre should be regarded with suspicion. The sample sent by you showed up an abnormally large number of bacteria, which was partly due to the ice melting some time before sample arrived. In culture media containing glucose, intestinal bacteria produce fermentation with liberation of gases that collect at the top of a fermentation tube. In my tube containing glucose bouillon there was considerable evolution of gases, into which I had put three drops of your sample of water. There is an acid formed in process of fermentation by these bacteria. In the medium of lactose-litmus-agar—a blue medium—a culture of your water showed red colonies from the effect of the acid produced by intestinal bacteria. Litmus milk was converted into a pink color and plain milk was coagulated—additional proofs of the presence of intestinal bacilli.

Judging your city water from this sample, I consider it bad and unfit for drinking purposes.

Respectfully submitted,

Duplicate.

ALBERT ANDERSON.

WILSON, N. C., November 30, 1892.

*Dr. E. C. Starnes,*

*Superintendent of Health, Asherille, N. C.*

DEAR DOCTOR:—I submit the following report of the bacteriological analysis of the last sample of water sent me from the public water supply of your city. There were 450 colonies of bacteria to the cubic centimetre—more than there should be for good water, but I find only those of a benign form in this sample.

Respectfully submitted,

Duplicate.

ALBERT ANDERSON.

## CHARLOTTE.

### REPORT OF BACTERIOLOGICAL EXAMINATION.

GIBSON STATION, N. C., November 3, 1896.

*Charlotte Water.*

DR. LEWIS:—I collected sample of water from faucet at the Buford Hotel October 16th, 4:40 a. m., and placed it in culture media the same morning at 11:30. The color of sample is a yellowish brown; muddy; deposit covered bottom of bottle after settling; no odor. The sample contains 7,500 bacteria to the cubic centimetre of water. I have isolated several motile bacilli from this water, among them proteus, but none of them show all of the cultural characters of the common colon bacillus. I think it fair to say that this water is filthy and is not safe for drinking purposes.

Yours truly,

W. T. PATE.

RALEIGH, November 10, 1896.

*Superintendent Water Works, Charlotte, N. C.*

DEAR SIR:—Dr. Pate, the Bacteriologist of the Board for Mecklenburg county, at the request of the Board, took a sample of your water from a faucet in the Buford House for examination. He reports the water to contain 7,500 bacteria to the cubic centimetre, and that he had isolated several motile bacilli, among them proteus, but while none of them showed all the cultural characters of the common colon bacillus, he concludes by saying: "I think it fair to say that this water is filthy, and that it is not safe for drinking purposes." It is unnecessary for me to say that this condition

of affairs should be remedied *at once*. The Board does not wish to do anything to harm any legitimate business, and I therefore call your attention to the matter and give you the opportunity to apply the remedy before I call the attention of the public authorities of the city to it, as I must do under instructions from the Board unless it is promptly done. I would suggest that you have another sample drawn from a drinking water faucet (preferably one in the Buford) and packed strictly in accordance with the directions on the back of the blank which I enclose, properly certified to, and another examination made by Dr. Pate, or some other reputable bacteriologist, immediately, and send me a copy of his report. I would thank you to let me know at once what you propose to do.

Yours truly,

RICHARD H. LEWIS,

*Secretary.*

CHARLOTTE, N. C., November 12, 1896.

*Dr. R. H. Lewis, Raleigh, N. C.*

MY DEAR SIR:—Hutchison handed me your communication this morning. I was surprised at the result of Dr. Pate's analysis, as I had only a few days since received from Prof. Leeds the result of an analysis made by him. I quote from him: "Your bacteriological analysis is eminently satisfactory, the water containing no bacteria." Will you kindly let me know whether or not Dr. Pate took the water himself or who furnished it to him. Wilder, health officer here, sent him specimen according to your instruction some month or six weeks ago, but has heard nothing from him. You know our filter plant has only been in operation about six weeks, and it may be that Pate's specimen was taken from a pipe little used and that contained a lot of the unfiltered water that had stagnated in it. I can explain it on no other hypothesis. In any event I shall send, or rather have sent by health officer, another specimen to Prof. Leeds, and if you will let me know Dr. Pate's address I will also send him specimen. Shall I write to him for bottle, or will you give me directions for sterilizing bottle? The specimen sent Dr. Leeds was taken from faucet on main pipe line, but I apprehend it makes no difference where the specimen is taken from as soon as the pipes are cleaned out, and I shall have the specimen taken from main tap at the Buford Hotel. As soon as I get returns will forward them to you. If there are any other suggestions you would make, will hold myself obliged if you will do so.

Understand, I shall have nothing to do with taking these specimens, but will have that done in all due form. I am anxious to



have these examinations as soon as possible, as I had thought after the analysis above alluded to that we were above criticism.

Yours truly,

R. J. BREVARD.

RALEIGH, November 13, 1896.

*Dr. R. J. Brevard, President Charlotte Water Co.,*

*Charlotte, N. C.*

MY DEAR DOCTOR:—Yours of 12th instant to hand. I note with pleasure your intention to promptly make a thorough investigation into the character of your water supply, and think it would be well to have examinations made by both Drs. Leeds and Pate—as you propose. The address of the latter is Gibson Station, and you should write to him for a sterilized bottle. The reason that nothing has been heard from him by Dr. Wilder in regard to the samples sent him is that neither was taken according to instructions. After waiting a month, or longer, he sent a sample from a *well*, although he was requested to send a sample drawn from a *faucet* of the *public water supply*, and later he sent a sample in his own bottle (properly sterilized, doubtless, but we can't take any chances) drawn immediately from the filter—again not what we asked for. To be sure of having it right the Board requested Dr. Pate to take the sample himself. This he did “from faucet at the Buford Hotel October 10, 4:40 A. M., and placed it in culture media the same morning at 11:30”—to use his own words. When I saw his report of 7,500 bacteria to the cubic centimetre the explanation you suggest—that the filtered water had not gotten into that main—occurred to me.

I cannot understand Prof. Leeds' statement that the water he examined contained “no bacteria”—he must have meant no pathogenic bacteria. \* \* \*

In fairness to your water I think it would be well to suggest to the health officer the importance of packing the sample in an *abundance* of ice and saw-dust in order to prevent the growth of the bacteria until it can reach Dr. Pate. Dr. Pate authorized me to say to the managers of water companies that he would make quantitative analysis for them for \$10. I enclose blank which gives explicit directions which must be carried out to the letter, or the analysis will be invalidated. Please let me have copy of all the analyses you have made, and oblige,

Yours very truly,

RICHARD H. LEWIS, *Secretary.*

CHARLOTTE, November 19, 1896.

*Dr. R. H. Lewis.*

I enclose Dr. Leed's analysis. \* \* \* \*

I wrote Dr. Pate a few days since asking him to send me two bottles, as I wish to have specimens examined from the filter and also from the tap at the Buford, so that I can tell whether the trouble, should it still exist, is in the pipes. Of course I understand these are separate analyses.

Now as to examinations: I found when we took charge of the plant two, which I can't lay my hand upon, made from, I think, Johns-Hopkins, certainly some Baltimore chemist, which were entirely satisfactory. These were chemical examinations. Since that time Professor Leeds and Dr. Herbert Battle have examined it for us. Satisfactory, except about two months ago Dr. Battle found the free ammonia ran too high. This I knew was due to the cause I mentioned to you, *i. e.* that owing to excessive drouth and waste of water, the reservoirs were nearly empty, and when we did have a heavy rain we had to fill up with the rain-water which ran over the fields and meadows—was about as muddy as possible. Since then we have gotten on a large supply, and of course that cannot occur again, and if it becomes necessary while it is costly I will abandon present supply and use that from Bear Creek.

Will write you as soon as I have anything further to communicate. I feel that I am giving you a good deal of trouble and certainly appreciate your kindness.

Yours truly,

R. J. BREVARD.

I did not mention that samples have been sent by health officer.

#### DR. LEED'S REPORT.

STEVENS' INSTITUTE OF TECHNOLOGY,

HOBOKEN, N. J., November 17, 1896.

#### *Sample of filtered water from Charlotte, N. C.*

The sample exhibited no bacteria after three days' culture with gelatine peptone solution, and may be regarded as practically free from bacteria.

Very respectfully,

ALBERT R. LEEDS,

*Professor of Chemistry, Stevens' Institute.*

CHARLOTTE, N. C., November 30, 1896.

*Dr. R. H. Lewis.*

MY DEAR SIR:—I enclose you bacteriological examination made by Professor Wm. Royal Stokes, of the Johns Hopkins Hospital, who is also bacteriologist for the city of Baltimore, and, I believe, of the State of Maryland. You will observe that it is addressed to Professor Penniman, of the firm (if I may call it so) of Penniman & Boone, chemists. They are the State chemists, and I understand are men of very high standing. I requested them to examine it chemically and submit same to the best bacteriologist for examination. I may mention that they made the chemical examination. Don't believe you lay much stress upon chemical examinations, so will not copy it, but they made this comment: "This water shows no sign of contamination upon chemical or bacteriological examination. It is admirably suited for manufacturing and domestic purposes."

Yours truly,

R. J. BREVARD.

I shall get Pate to re-examine as soon as he sends the bottle, which he says he will do as soon as he gets a new instrument.

#### DR. STOKES' REPORT.

HEALTH DEPARTMENT,

CITY HALL ANNEX,

Gay Street between Lexington and Saratoga Sts.,  
BALTIMORE, MD.

*Prof. Penniman.*

DEAR SIR:—The sample you sent me was clear, showing no sediment upon standing twenty-four hours and no odor.

Microscopic sediment: No animalculae, plants, algae. Germs: *protococcus spiralis*.

These minute vegetable organisms are present in pure water, and the absence of animalculae suggests this condition also.

Colonies per cubic centimeter, 146.

This is very low as compared to many of our municipal water supplies—Philadelphia often showing 15,000.

Fifty centimeters of water was examined by makers of growth in bouillon, plating, and then inoculation of fermentation tubes of glucose, lactose and saccharose, 1 per cent. bouillon.

No gas production took place after twenty-four hours, showing that the colon bacillus, *bacillus coli communis*, the normal inhabitant of the intestine, was not present in this amount of water.

The examination shows that the sample of water sent is pure

bacteriologically; in fact, remarkably so. It is not customary to base absolute conclusions upon a single examination of an entire water supply, and a second examination would enable me to gauge more correctly of the exact condition of the water. This should be made after an interval of several weeks.

Very respectfully yours,

WM. ROYAL STOKES.

In a letter from Dr. Pate, dated December 28, 1896, he says: "I have examined two samples from the Charlotte supply, both remarkable for their bacteriological purity."

Since this investigation was made the Charlotte water works have been purchased by the city.

#### CONCORD.

##### REPORT OF BACTERIOLOGICAL EXAMINATION.

GIBSON STATION, N. C., October 12, 1896.

*To Dr. Young, Concord.*

The sample collected by you from the public water supply of Concord, September 25, contains 600 bacteria to the cubic centimetre of water. It contains both proteus and intestinal bacilli. In point of numbers the water is fair, but in quality of bacteria *bad*.

The indications are that if you will clean up your water shed, and stop all sources of fecal contamination, you would have fine drinking water.

Yours truly,

Duplicate.

W. T. PATE.

GIBSON STATION, N. C., December 1, 1896.

*Dr. Young, Concord.*

The sample of water sent by you from the public water supply of Concord, November 10, contains 620 bacteria to the cubic centimetre of water. No intestinal bacilli. *Proteus vulgaris* present. This is better water than the sample sent September 25, but is not considered above suspicion.

Yours truly

W. T. PATE.

#### DURHAM.

DURHAM, N. C., September 5, 1896.

*Dr. J. M. Manning, Superintendent of Health.*

DEAR SIR:—In making a quantitative examination of the sample of water collected and sent me by you on September 2, 1896, I have the honor to submit the following report: A quan-

titative analysis shows 128 colonies to the cubic centimetre. This number indicates that the water is good, if all the bacteria are of benign form, and I have no reason to doubt that they are, from the tests used. Respectfully submitted,

Duplicate.

ALBERT ANDERSON.

### FAYETTEVILLE.

#### REPORT OF BACTERIOLOGICAL EXAMINATION.

GIBSON STATION, N. C., Nov. 10, 1896.

*Dr. Lewis, Secretary North Carolina Board of Health,*

*Raleigh, N. C.*

DEAR DOCTOR:—As requested by you about October 1, I visited Fayetteville October 27, and collected a sample of water from the public water supply for examination. I called at the office of Superintendent of Health twice during the day, but did not find him in. Dr. McNeill kindly took me out to the water works pond and placed me under obligation to him for many favors.

Fayetteville has the possibilities of an ideal water supply. The source is a bold sand hill branch, rising from springs among the hills in the woods, flowing (without any surrounding swamp) over a coarse sand and gravelly bed to a short pond one and a-half miles northwest from the town. From the pond it is pumped through iron pipes to the town. The stand-pipe is on the summit of a hill ("Haymount") and gives a full pressure. The water shed proper is narrow and short, has a sandy soil, timbered with scrubby oak and a few old-field pine, and covered with trash that has drifted into heaps in many places. There are four houses on the water shed, two cabins, one farm house and the keeper's house. Stock have free access to the pond. I noticed the droppings of cattle within thirty feet of the intake.

With the expenditure of a small amount this water supply could be placed above suspicion. It would be necessary to remove the two cabins, the growth, the trash, and dyke the farm house on the pond side; lay some drains about the keepers' house to carry surface water into branch below intake, and wire in the shed. Then by a system of terracing all water that falls on the shed could be carried into the pond and filtered. All of this is practicable, and, if carried out, would give Fayetteville as safe a water supply as has *any town anywhere*. I am informed that this water supply is owned by a Baltimore company.

The sample of water for examination was taken from a faucet at the Hotel LaFayette. It contains 120 bacteria to the cubic centimetre of water. It has very few fermentative bacteria. No intestinal bacilli were found. It is very fair drinking water. In fact, it is

a sample of this water under the best of conditions. There had been no surface water for several days, the pond had been run low on account of a leak, and the water in the pond was mostly spring water. Much filth and many bacteria must be carried into the pond with every large rain.

Yours respectfully,

W. T. PATE.

# GOLDSBORO.

## REPORT OF BACTERIOLOGICAL EXAMINATION.

AUGUST 29, 1896.

*Dr. W. J. Jones, Jr.,*

*Superintendent of Health, Goldsboro, N. C.*

DEAR SIR: I have the honor to submit the following report of a quantitative bacteriological examination of the sample of water collected and sent me by you on 20th inst. The quantitative analysis shows only 100 bacteria to the cubic centimetre, and this number indicates good water, if all the bacteria are of the benign form, but other tests throw some doubt upon the bacteria being benign. I would advise that you have both a quantitative and qualitative analysis made soon. Respectfully submitted,

ALBERT ANDERSON.

Duplicate.

RALEIGH, N. C., October 6, 1896.

*Dr. W. J. Jones, Jr., Superintendent of Health,*

*Goldsboro, N. C.*

DEAR DOCTOR:—I learn from the bacteriological examination recently made of the public water supply of your city by Dr. Anderson, at the request of the Board, that there is some doubt about its safety. I would therefore beg of you to urge upon the superintendent of the water company the importance of having made immediately a thorough examination. It would manifestly be to the interest of the company, to say nothing of the health of the people. Please let me know before the 14th inst., if possible, what it is proposed to do, and oblige,

Yours very truly,

HICH'D H. LEWIS, M. D.,

*Secretary.*

GOLDSBORO, N. C., October 19, 1896.

*Dr. R. H. Lewis, Raleigh, N. C.*

DEAR SIR:—In regard to your letter concerning the public water in Goldsboro, will say that the superintendent of water company says that the filter was out of order at the time the sam-

ple for analysis was made. He says Dr. Anderson's report is very unsatisfactory, but is willing to send you a sample at any time, as he wants pure water, as his contract with the filter company calls for pure water. Awaiting your wishes, I am,

Yours very truly,

W. J. JONES, JR.

WILSON, N. C., November 30, 1896.

*Dr. W. J. Jones,*

*Superintendent of Health, Goldsboro, N. C.*

DEAR DOCTOR:—The following report of the bacteriological analysis of last sample of water sent me from the public water supply of your city is as follows: The number of colonies of bacteria to the cubic centimetre is 250, this number exceeding that in the previous sample 180, but all the bacteria in present sample were of the benign form.

Respectfully submitted,

ALBERT ANDERSON.

Duplicate.

GREENSBORO.

REPORT OF BACTERIOLOGICAL EXAMINATION.

WILSON, N. C., September 30, 1896.

*W. J. Richardson, M. D., Superintendent of Health, Greensboro, N. C.*

DEAR SIR:—I have the honor to submit the following report of the bacteriological examination of sample of water which you collected and sent me on September 12, 1896, from the public water supply of your city. There were 276 colonies to the cubic centimetre obtained in a quantitative analysis, and this number of the benign form of bacteria would indicate that your city water was fair for drinking purposes. But other tests showed the sample to contain intestinal bacilli. The intestinal bacillus produces a collection of gas in a fermentation tube containing a glucose medium. In my tube filled with glucose bouillon into which I had put three drops of water of your sample, there was evolution of gases at the top of tube. This bacillus also produces an acid in process of fermentation, and the presence of this acid was shown by reddening the blue culture medium—known as lactose-litmus agar—in which a culture of this water was made. It would be advisable to remove the source of contamination at once, as the typhoid germs and the intestinal bacillus are sometimes associated.

Respectfully submitted,

ALBERT ANDERSON.

WILSON, N. C., November 30, 1896.

*Dr. W. J. Richardson, Superintendent of Health, Greensboro, N. C.*

DEAR DOCTOR:—I am glad to be able to submit the following report of the bacteriological analysis of the last sample of water sent me from the public water supply of your city. There were 225 colonies of bacteria to the cubic centimetre, fifty-one less than in the first sample examined, and all of the benign form.

Respectfully submitted,

ALBERT ANDERSON.

HENDERSON.

#### REPORT OF BACTERIOLOGICAL EXAMINATION.

GIBSON STATION, N. C., September 10, 1896.

*Dr. Tucker, Henderson.*

The sample of water collected by you August 20, from the public water supply of Henderson, contains 1,400 bacteria to the cubic centimetre of water. It contains intestinal bacilli.

Yours truly,

W. T. PATE.

RALEIGH, N. C., September 26, 1896.

*J. H. Tucker, M. D., Superintendent of Health of Vance County, Henderson, N. C.*

MY DEAR DOCTOR:—I learn from the bacteriological examination of the public water supply of your town recently made by Dr. Pate for the Board of Health that it "contains intestinal bacilli." It would be superfluous for me to call your attention to the fact that contamination with intestinal bacilli is a form of contamination very dangerous to the public health, or to the urgent necessity for the immediate purification of your water supply and the prevention of future contamination. I would thank you to inform me as soon as possible what action the water company proposes to take and how soon.

Very truly yours,

RICH'D H. LEWIS, M. D., *Secretary.*

HENDERSON, N. C., September, 28, 1896.

*Dr. R. H. Lewis, Secretary State Board of Health,*

*Raleigh, N. C.*

DEAR DOCTOR:—Your favor of the 26th, calling my attention to the bacteriological examination of our public water supply by Dr. Pate has been duly received. Dr. Pate had written me on the result of the examination, and the matter was at once brought to the notice of the Henderson Water Supply Company, and a prom-



ise exacted from the superintendent that immediate steps would be taken to have a further examination of the water made by some competent bacteriologist *on the spot*, and, should the investigation of Dr. Pate be verified, to institute at once all necessary measures for complete purification of the supply.

I have suggested to the superintendent that correspondence with your office will, doubtless, secure the name of some competent and responsible expert who would come to Henderson and make an exhaustive study of the water and a thorough investigation of the shed and surroundings, and thus be enabled to give advice which would be acceptable to the company, your Board, and the authorities of Henderson. He has promised to write for such information.

As I wrote Dr. Pate, the good results obtained from chemical analysis by Dr. Venable and Prof. Brewer (a copy of which I send you by today's mail), and the absence of apparent sources of contamination, had caused us to feel that our water was above the average in purity, and we were quite unprepared for the announcement that it contained "intestinal bacilli." The sample examined by Dr. Pate was collected August 20th, with all possible care, and is, doubtless, a fair sample of our water in very hot and dry weather, as the pond from which the supply is obtained was on that date at its lowest mark. The water is used exclusively in our jail and in a few private families, and up to the present time we have had no case of fever, dysentery, diarrhoea, or other sickness which could be traced to its use.

I am very glad to feel that the Board of Health will give us the weight of their authority in this matter, and I will most cheerfully carry out any suggestion you may make. I will confer further with the company, and will advise you fully of any action taken.

I am,

Yours very truly,

J. H. TUCKER.

*Superintendent Health Vance County.*

HENDERSON, N. C., September 28, 1896.

*Dr. Rich'd H. Lewis, Secretary North Carolina Board of Health,  
Raleigh, N. C.*

DEAR SIR :—Dr. Tucker has shown me your letter of recent date. He had also shown me the letter from Dr. Pate, some time ago, and had written him asking him if he would not make a second analysis, and we were waiting his reply. Dr. Pate now writes that he cannot do so before winter. I have written the President of our Company, who lives near New York, to engage a recognized bac-

teriolgologist to make a second analysis, and if necessary, to come to Henderson, or we will have a second analysis made at Johns Hopkins, wherever we can secure it quickest. Would you not order a second analysis for us. We take every precaution to keep the water-shed clear, and go over it every week on foot. There is no source of contamination, and when the sample used by Dr. Pate was drawn the water was very low, or at least while there was an abundant supply, yet the water in the lake was from three inches to seven feet deep, covering at least forty acres. The principal feeding was done by springs in the lake, and one very large spring which flowed down, and from which there was hardly an opportunity for intestinal deposits. I enclose you a copy of the chemical analysis made by different chemists. I notice that Section 19 of the Act establishing the Board of Health, Chap. 214, Laws of 1893, provides for consultation with your Board. What remedy do you suggest in the event that Dr. Pate's analysis should be verified? We will be pleased to execute your instructions if in power. Awaiting the favor of reply,

Very respectfully,

J. H. BRIDGERS,

*Superintendent and Treasurer.*

RALEIGH, N. C., September 28, 1896.

*J. H. Bridgers, Esq., Superintendent Henderson Water Company,  
Henderson, N. C.*

DEAR SIR:—I am very much gratified to learn from yours of even date, received this P. M., that in compliance with my letter of 26th inst to Superintendent of Health Tucker, you propose to take immediately the proper steps for ascertaining the exact condition of your water. I would respectfully suggest that this Board would be glad to have all samples for analysis taken by or in the presence of its representative, Dr. Tucker. There could then be no opportunity for adverse criticism on the part of persons hostile to your company. We do not wish to do anything to hurt your business, but on the contrary to aid you in every way we can to assure the purity of the water you furnish to the public. Should further bacteriological examination confirm the intestinal infection of the water, or show any other dangerous contamination, the Board would be more than glad to advise with you as to the best method of remedying the trouble. You will oblige me by sending me copies of the analyses you have made.

Very truly yours,

RICH'D H. LEWIS, M. D.,

*Secretary.*

HENDERSON, N. C., October 1, 1896.

*Dr. R. H. Lewis, Secretary North Carolina Board of Health,  
Raleigh, N. C.*

DEAR SIR:—We would be pleased to have a copy of the analysis made by Dr. Pate of our water, in order to proceed at the source of the trouble.

I hope to receive the same by the earliest mail.

Very truly,

J. H. BRIDGERS,  
*Superintendent and Treasurer.*

RALEIGH, N. C., October 3, 1896.

*Mr. J. H. Bridgers, Superintendent Water Company, Henderson, N. C.*

DEAR SIR:—Yours of 1st inst. received yesterday P. M., asking for "a copy of the analysis made by Dr. Pate of our (your) water," is at hand, and I comply with pleasure. It is as follows:

"To Dr. Tucker, Henderson.

"The sample of water collected by you August 20th. from the water supply of Henderson, contains 1,400 bacteria to the cubic centimetre of water. It contains intestinal bacilli.

"Yours truly,

"W. T. PATE."

"Duplicate."

The Board could not afford to pay for a complete analysis of all the water supplies in the State, but its object is to ascertain if a water is dangerous, and if so to call the attention of the proper authorities to it, that they may remedy it. If I can serve you let me know.

Yours truly,

RICHARD H. LEWIS, M. D.,  
*Secretary.*

GIBSON STATION, N. C., December 1, 1896.

*Dr. Tucker, Henderson.*

The sample of water sent by you from the public water supply of Henderson, November 9, contains 820 bacteria to the cubic centimetre of water. No intestinal bacilli. In point of numbers and quality of bacteria this sample is much better than the water sent August 20. I consider this sample fair drinking water.

Yours truly,

Duplicate.

W. T. PATE.

HENDERSON, N. C., December 7, 1896.

*Dr. R. H. Lewis, Secretary, Etc., Raleigh, N. C.*

DEAR SIR:—I notice the bacteriological analysis made by Dr. Pate is much improved, and I suppose satisfactory.

I also note the chemical analysis made at the North Carolina Experiment Station seems to indicate too much free and albuminoid ammonia, though taken in connection with the low per centage of chlorine, I do not think it is a bad water. But the large amount of ammonia present is due to temporary cause, and had the sample been taken October 9th or December 9th I think there would be a very small amount of ammonia. Of the many chemical analyses this is the only one which ever raised a suspicion. I would be glad to have you order a sample drawn about the 20th of this month, and have it examined. If you intend to report this analysis to the Governor, I would be obliged not to have it go in, as it does not show the condition of our supply for about eleven months in the year. I enclose the original by Professor Venable, which you will kindly return.

Very truly yours,

J. H. BRIDGERS.

*Superintendent and Treasurer.*

Answered in letter to Superintendent of Health J. H. Tucker, M. D., dated December 11th.

HENDERSON, N. C., December 9, 1896.

*Dr. R. H. Lewis, Secretary State Board of Health, Raleigh, N. C.*

DEAR DOCTOR:—I am in receipt of the chemical analysis made by Dr. Battle, of our public water supply, and also a report from Dr. Pate, of the bacteriological examination, and have submitted both reports to our town commissioners and to the "Henderson Water Supply Company." I presume the original reports are in your office, and that you are aware of the results. You will observe that the chemical analysis gives us a suspicious, or at least a very doubtful water, while the bacteriological report shows no dangerous contamination, and classes the water as "fair drinking water." In view of the apparent difference of the two reports, and especially in view of the fact that the bacteriological examination of August 9th showed the water to contain "intestinal bacilli," and to be "dangerous to public health," I am requested by our Board of Commissioners to communicate with you and ask that you will cause a sanitary inspection to be made of our water supply, surroundings, sheds, etc., and that you will give us

the benefit of your advice in this important matter. The water supply company is not inclined, at the present time, to institute measures for the improvement or purification of the supply, and yet there is a widespread impression among many of us that the water is impure, and that we should have furnished a better supply. I shall be very glad to hear from you about this matter. I am,

Yours very truly,

J. H. TUCKER,  
*Superintendent of Health.*

RALPHIGH, December 11, 1896.

*Dr. J. H. Tucker, Superintendent of Health, Henderson, N. C.*

MY DEAR DOCTOR:—In reply to yours of 9th instant, I regret to inform you that the Board's appropriation for the current year is exhausted, and that in consequence it will be impossible to grant the request of your town commissioners for a sanitary inspection of your water supply. The question of water supplies in our State is for the most part a serious one. The water is in most instances taken from a small stream fed from an inhabited and cultivated watershed. With such a source it will be very difficult to prevent the infection of the water at one time or another—certainly as the water companies generally manage it. I have thought a great deal about it, and it seems to me that the only way to do it is to have the watershed thoroughly policed by an officer who shall devote his entire time to it. It is important, of course, to have the water frequently examined, but when it is found to be contaminated it is too late, the damage has already been done. The thing to do is to prevent the contamination. Leaving out the question of the public health, I believe the money paid to a reliable man—say \$500 a year—would more than pay the water company in the increased confidence in the water on the part of the community.

Whether, in case of an epidemic clearly traceable to the public water supply, a suit for damages would lie against the water company if it had failed to take all reasonable precautions to protect the water, I do not know, but it ought to. Please think this matter over carefully and give me the benefit of your valuable opinion.

I enclose a permit for another chemical examination, and I would thank you to take the sample on the 20th, in accordance with the request of Mr. Bridgers, who, for some reason which he does not mention, thinks the water would make a better showing about that time in the month. Can you tell me why? Or will you ask him to do so? Oblige me further by showing him this letter, returning to him the copy of Dr. Venable's analysis and asking him to consider this a reply to his letter of the 7th, as I

have so much to do at this season on account of the preparation of my biennial report. Let me hear from you.

Very truly yours,

RICHARD H. LEWIS, *Secretary*.

### NEW BERN.

#### REPORT OF BACTERIOLOGICAL EXAMINATION.

WILSON, N. C., September 2, 1896.

*Dr. J. W. Duguid, Superintendent of Health, New Bern, N. C.*

DEAR SIR:—I have the honor to submit the following report of the sample of water collected and sent by you on 29th August, 1896. A quantitative bacteriological examination shows 112 bacteria colonies to the cubic centimetre. Were it not for some evolution of gas in the fermentation tube, I would consider the water good, and were all the bacteria of benign form. But as this test throws some doubt upon the purity of your water, it would be advisable to have both a quantitative and qualitative analysis made soon. If you have much typhoid fever among those who use your water, the sooner this analysis is made the better.

Respectfully submitted,

ALBERT ANDERSON.

P. S. DEAR DR. LEWIS:—Since sending my report to Dr. Duguid, he writes me that there has never been a case of typhoid fever among those who drink this water. It is not necessary, therefore, to examine this again right away.

RALEIGH, N. C., October 6, 1896.

*Dr. J. W. Duguid, Superintendent of Health, New Bern, N. C.*

DEAR DOCTOR:—From Dr. Anderson's report of his recent bacteriological examination of the public water supply of your city I learn that there is some doubt about its safety. Drinking water should be like Caesar's wife—above suspicion—and no water containing fermenting bacteria, which means, as I understand it, bacteria belonging to the colon group, can claim that distinction. The fact that no cases of typhoid fever have been traced to it is no guarantee, if it is contaminated with human excrement, that it will not receive that poison and precipitate an epidemic on a large scale. You are doubtless familiar with the famous Plymouth epidemic. I would therefore urge upon you the importance of having the water company undertake at once a thorough examination of the water, and either dispel the doubt or confirm it and set about remedying the trouble.

Please let me know before the 14th what is proposed to be done, as the Board meets on the 15th.

Very truly yours,

RICHARD H. LEWIS, M. D.,

*Secretary.*

No reply was received to this letter.

A letter from Dr. Anderson dated December 8th, in reply to one of inquiry states that Dr. Duguid, the Superintendent of Health (for reasons not given, but doubtless sufficient), had "instructed Dr. ——— to attend to sending the sample and I sent ——— the bottle, but have not heard from him. Will examine the sample whenever it comes." In a second letter dated December 24th, Dr. Anderson says, "I have not been able to get another sample from New Berne."

#### RALEIGH.

##### REPORT OF BACTERIOLOGICAL EXAMINATION.

WILSON, N. C., September 28, 1896.

*Dr. James McKee, City Superintendent of Health, Raleigh, N. C.*

DEAR SIR:—I have the honor to submit the following report of the bacteriological examination of sample of water which you sent me 12th September, 1896, collected from the public water supply of your city, drawn from faucets at water tower. The average number of bacteria colonies to the cubic centimetre was 125. This number of the benign form would indicate the water to be good, but some of the tests showed that the sample contained intestinal bacteria. These bacteria produce an evolution of gas formation in glucose-bouillon, and in my fermentation tube containing this medium there was fermentation, producing a collection of gas at the top of the tube, into which had been put three drops of water. There is an acid formed in process of fermentation, produced by the presence of intestinal bacteria, and colonies of intestinal bacilli will be red in culture upon a blue culture medium. Lactose-litmus agar is a medium of this color, which I used and obtained red colonies, thereby getting an additional proof of intestinal bacteria in the water. I took a pure culture from one of these red colonies, and streaked it upon sterilized potato, and got the characteristic growth of this germ. The source of contamination should be removed at once, as the typhoid bacilli and the above are frequently associated.

Respectfully submitted,

Duplicate.

ALBERT ANDERSON.

RALEIGH, N. C., October 10, 1896.

*R. H. Lewis, M. D., Secretary North Carolina Board of Health,  
Raleigh, N. C.*

DEAR SIR :—Replying to yours of 6th instant, will state that I have seen the authorities of the Raleigh Water Company and they have assured me that there shall be no delay in applying the promptest remedies to relieve the evil ascertained by the bacteriological examination of specimen sent on September 12, 1896.

I was astonished at the result of the examination, for I am at a loss to know where the bacillus coli communis came from. Thirty days ago a specimen was obtained and sent to the same bacteriologist, who failed to find anything of the kind. There are no surface privies on the shed and no sewage whatever is emptied into the stream. I shall, on Monday, inspect the watershed from the source of the stream in Cary to the intake and have abated promptly, as far as possible, any nuisance on it likely to contaminate the water supply. The Water Company is as ready to remove the evil as the Board of Health is to demand it.

Very truly yours,

JAMES MCKEE, M. D.,  
*City Superintendent Health.*

RALEIGH, N. C., October 30, 1896.

*Dr. R. H. Lewis, Secretary North Carolina Board of Health,  
Raleigh, N. C.*

DEAR SIR :—Inclosed is a copy of the report of the analysis of the water from the city's water supply, made by Dr. A. C. Abbott, in the Laboratory of Hygiene at the University of Pennsylvania. You will observe that the qualitative examination differs from that made by Dr. Albert Anderson, the bacteriologist of Wilson, N. C. Dr. Anderson's examination reveals the presence of intestinal bacilli, and Dr. Abbott's does not. A glance at the mortuary record of the city shows that there have been very few intestinal disturbances registered as the cause of death and fewer cases of typhoid fever reported by the physicians than usual, and I am told by the superintendent of the water company that there has been a very marked increase in the water consumers. These facts show that the water cannot be anything but healthy.

Commending your Board for their interest in the matter of healthful water supplies in the various towns in North Carolina, I am,

Very respectfully,

JAMES MCKEE, M. D.,  
*President City Board of Health.*



PHILADELPHIA, Pa., October 17, 1896.

*Dr. James McKee, President Board of Health, Raleigh, N. C.*

DEAR SIR:—We give below the report of the analysis of the sample of water received by express from you October 14th. Both quantitative and qualitative examinations were made. The quantitative tests gave a small number—only 236 bacteria per cubic centimeter.

The qualitative examination revealed no organisms whatever of a suspicious nature.

Yours truly,

(Signed)

A. C. ABBOTT.

SALEM.

#### REPORT OF BACTERIOLOGICAL EXAMINATION.

*To Dr. Bahnson, Salem.*

The sample of water collected by you September 2d from the public water supply of Salem contains 1,200 bacteria to the cubic centimetre of water. It does not contain intestinal bacilli, but does contain proteus vulgaris. This sample was shipped without ice, and it is probable that the number of bacteria in it was greater when plated than when fresh taken.

Yours truly,

Duplicate.

W. T. PATE.

SALISBURY.

#### REPORT OF BACTERIOLOGICAL EXAMINATION.

WILSON, N. C., September 30, 1896.

*Dr. John Whitehead, Superintendent of Health, Salisbury, N. C.*

DEAR SIR:—I have the honor to submit the following report of the bacteriological analysis of sample of water which Dr. McKinzie collected and sent to me September 18, 1896, from the public water supply of your city. A quantitative analysis and a few tests used in a qualitative examination show your sample to be good drinking water. There were only 121 bacteria to the cubic centimetre and only water containing over 400 bacteria of the benign form should be regarded with suspicion.

Respectfully,

ALBERT ANDERSON.

Duplicate.

WILMINGTON.

#### REPORT OF BACTERIOLOGICAL EXAMINATION.

GIBSON STATION, October 12, 1896.

*To Dr. Shepard, Wilmington.*

The sample of water collected by you from the public water supply

ply of Wilmington, September 22, contains 3,600 bacteria to the cubic centimetre. These bacteria are all benign forms. The number in this sample is considerably less than in the sample collected by Dr. Harris last February 3, but is still entirely too high for good drinking water.

Yours truly,  
W. T. PATE.

WILSON.

#### REPORT OF BACTERIOLOGICAL EXAMINATION.

WILSON, N. C., August 27, 1896.

*Dr. Nathan Anderson, Superintendent of Health, Wilson, N. C.*

SIR:—In making a quantitative bacteriological analysis of the sample of water collected by you on 25th instant, I find only 154 bacteria to the cubic centimetre. This with other tests shows that the water from the city water system is good.

Respectfully submitted,

ALBERT ANDERSON.

Duplicate.

WINSTON.

#### REPORT OF BACTERIOLOGICAL EXAMINATION.

*To Dr. Bynum, Winston.*

The sample of water collected by you September 2, from the public water supply of Winston, contains 3,150 bacteria to the cubic centimetre of water. It ferments both glucose and lactose bouillon, but I was unable to isolate the fermenting bacteria. I consider the water suspicious.

Yours truly,

Duplicate.

W. T. PATE.

#### LETTER FROM DR. BYNUM TO THE SECRETARY OF THE BOARD.

WINSTON, N. C., September 19, 1896.

DEAR DOCTOR:—A few days since I sent to Dr. W. T. Pate a sample of drinking water from our city water supply. He says it contains 3,150 bacteria to the cubic centimeter, but says he was unable to isolate the bacteria, and says he considers our supply *suspicious*. Our water is sent into the city from two different wells and a supply pond, making three different sources. I would like to have the privilege of sending three different samples that I may locate the trouble. Also, I would like to have a sample of ice from our ice factory examined, and if you consent to this, instruct me in regard to whether the ice must be melted here.

There has been a great deal of complaint about the water used in making this ice, and I cannot catch up with the manufacturers by asking for a sample of this water. Please give me an early reply and oblige.

JOHN BYNUM,  
*Health Officer.*

RALEIGH, N. C., September 25, 1896.

*Dr. John Bynum, Health Officer, Winston, N. C.*

MY DEAR DOCTOR:—On my return from the meeting of the American Public Health Association I found your letter of 10th inst.

I note your request for four bacteriological examinations of the three sources of your water supply, and of the ice manufactured in your town. I regret that we cannot grant it, for the reason that the appropriation made to the Board is too small to justify the expense. The intention of the Board in ordering a single examination of each of the municipal water supplies of the State was to ascertain for itself if the different water companies were furnishing good and safe water or not to the people, and if not to notify them of the fact and call upon them in the interest of the public health to promptly remedy the trouble. Should any municipal or private water company fail to do so after notice, it would become the duty of the Board to inform the people as to the character of the water furnished them. It goes without saying what the effect of such information would be upon the business of the company. You will therefore transmit to the company furnishing water to your city a copy of Dr. Pate's report, notify it of the position of the Board on the subject, as above stated, and see that a thorough investigation is instituted at once. If this investigation should show the water to be contaminated, steps must be taken immediately to purify it. You would oblige me by letting me know as soon as possible what action in the premises the company proposes to take.

It is unnecessary, of course, for me to suggest that your duty as Health Officer calls for prompt and energetic action on your part.

Hoping to hear very soon that the investigation has been begun, I am,

Very truly yours,

RICH'D H. LEWIS, M. D.,  
*Secretary.*

RALEIGH, October 6, 1896

*Dr. John Bynum, Health Officer, Winston, N. C.*

DEAR DOCTOR:—Not having heard from you in reply to my

letter of 25th ultimo, I write to ask what steps have been taken by those in authority looking to a thorough investigation of the quality of your public water supply—an investigation rendered immediately necessary by the suspicion of its safety caused by the bacteriological examination of Dr. Pate. I would very much appreciate a prompt and detailed reply so that I may be able to report progress to the meeting of the Board which takes place at Charlotte on the 15th instant. By the way, can't you attend our "Health Conference" there on that day? I am sure you would find it interesting and valuable.

Very truly yours,

RICH'D H. LEWIS, M. D., *Secretary*.

No reply to this was received. It should be said, however, in justice to Dr. Bynum, that information from Dr. Pate is to the effect that he has, in correspondence direct with the latter, shown a laudable interest in the matter.

REPORT ON WINSTON WATER SUPPLY BY J. C. CHASE,  
ENGINEER OF THE BOARD, MADE OCTOBER 19, 1896.

A large proportion of the water furnished by the public supply is impounded surface water, the balance being derived from two large wells, which were the original source of supply. The surface water supply comes from a small stream fed by several smaller branches, whose sources are numerous springs of varying size.

This water in its normal condition is of attractive appearance and has been assumed to be of satisfactory quality. At times of heavy rains the water becomes very turbid, and at such times the flow of the stream is not allowed to pass into the storage basin.

To still further insure the purity of the supply it is filtered by one of the mechanical devices which are now in quite common use and generally doing excellent work.

The water-shed from whence the supply is derived is quite sparsely settled, and the general presumption would be that the water would ordinarily be free from general pollution. It has been assumed, and with some show of reason, that anything of a detrimental nature would not be likely to find its way into the water-courses, except at times of heavy rainfall, at which time, as before mentioned, the storm water is caused to pass by the storage basin until the water runs clear, by which time it is assumed that any probable pollution has been washed away.

A recent bacteriological analysis of the water arousing some suspicion as to its being free from pollution, it was deemed best to have a thorough inspection of the water-shed, which was made by

the writer, accompanied by Mr. J. O. Magruder, Superintendent of the Water Works. With one exception, nothing was found that calls for specific mention. On one of the small feeders of the main stream a house is so situated that apparently a large portion of its daily increment of filth easily finds its way into the water course, which would be likely to account for the suspicious results of the analysis.

It is considered highly desirable that this dwelling should be removed, if possible; if not, the feeder which it contaminates should be eliminated from the main supply, which can very easily be done. It is quite probable that other feeders will have to be dispensed with in due time, when the watershed has become more thickly settled, in order to assure a reasonable degree of freedom from pollution. It would be far more desirable, however, for the city to acquire the greater portion, if not all of the territory, for it is believed that in this way only can the future integrity of the supply be assured. It would be advisable to have analyses made of the various small streams tributary to the large one, in order to determine from whence the suspected pollution comes.

Respectfully submitted,

JOHN C. CHASE.

WINSTON, N. C., December 15, 1896.

*Dr W. T. Pate, Gibson, N. C.*

DEAR SIR:—Dr. Bynum sends you a sample of water from the tap this p. m. This sample is on the part of the State, and is taken after I have disposed of the little well and the north-east branch, both of which showed objectionable matter.

Am sorry we could not send this sooner, but have just gotten the branch turned away, and hope this will reach you in time and show a good analysis for your final report.

Yours truly,

J. O. MAGRUDER,

*City Engineer and Supt. Water Works.*

GIBSON STATION, N. C., December 28, 1896.

Duplicate for Dr. Lewis.

DR. BYNUM:—Examination of sample sent by you December 15th, marked number 6, from tap public water supply of Winston, finished.

Sample clean. No sediment. Number of bacteria to the cubic centimetre of water, 420. No fermentation in glucose or lactose bouillon. The water very good.

Yours truly,

W. T. PATE.

In his letter accompanying above report Dr. Pate says :  
"These people seem to have made an honest effort to get safe water. I have examined five samples for the city, one from each source of supply and one of ice. I enclose Magruder's last letter."

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## OTHER WATER SUPPLIES.

### OXFORD ORPHAN ASYLUM.

The letters referred to in the Secretary's letter below are not printed because they are quite long and deal largely with other matter than the subject in hand. The portion relating to the water supply is recapitulated in the Secretary's reply :

RALEIGH, N. C., September 7, 1896.

*Captain C. B. Benson, Secretary Board of Public Charities,  
Raleigh, N. C.*

MY DEAR SIR:—In reply to your communication enclosing letter from the Superintendent of the Oxford Orphan Asylum in regard to three cases of typhoid fever among the children, and transmitting request from his Excellency the Governor, that a bacteriological examination be made of the water supply, I beg to say : From the small number of cases among so many using the same drinking water I hardly think that the source of the infection is there, but in some other well or spring from which they probably drank. I have, however, with pleasure, in compliance with the Governor's request, sent a permit for a bacteriological examination to Dr. Booth, the County Superintendent of Health of Granville county. When the report is received I will send you a copy.

The Board of Health has ordered a sanitary inspection made of all the State institutions and the Asylum for orphans will be visited in common with the others. I will also take pleasure in

sending you a copy of the report of the visiting committee when it is made.

Very truly yours,

RICHARD H. LEWIS, M. D.,

*Secretary.*

WILSON, N. C., November 30, 1896.

*Dr. T. L. Booth, Superintendent of Health, Oxford, N. C.*

DEAR SIR:—Every test used in the bacteriological examination of the sample of water which you sent me shows it to be bad and unfit for use. There were so many colonies of bacteria to the cubic centimetre that I could not count them accurately. The coagulation of milk, formation of gas in fermentation tube, characteristic growth on potato, and a decided fecal odor, are sufficient tests to mention to show that the water is contaminated with intestinal bacilli. You should at once remove the source of contamination or prohibit use of the water.

Respectfully submitted,

ALBERT ANDERSON.

RALEIGH, N. C., December 7, 1896.

*Dr. T. L. Booth, Superintendent of Health, Oxford, N. C.*

MY DEAR DOCTOR:—I have just received the report of Dr. Anderson on the bacteriological examination of the water of the well at the Orphan Asylum. It shows the water to be dangerously polluted with intestinal bacilli. As the asylum has another and better water supply I would advise its being filled up. Please let me know what action has been taken by the authorities of the institution. I am informed that he sent them a copy of the report sometime ago.

Very truly yours,

RICHARD H. LEWIS, *Secretary.*

OXFORD, N. C., December 10, 1896.

*Dr. R. H. Lewis, Raleigh, N. C.*

MY DEAR DOCTOR:—Your letter relative to the well at the Oxford Orphan Asylum just received. In reply I beg leave to say that its use has been discontinued, and it is so closed that no water can be taken from it, and there has been no new case of fever, of any type, at the asylum since its discontinuance.

Very truly yours,

T. L. BOOTH,

*Superintendent of Health.*

In a personal interview with Dr. Booth since the above report was made, he informed the writer that in addition to the three cases of typical typhoid fever referred to there had been in the institution many other cases of continued fever of a more or less mild form, nondescript and atypical in character. It is more than probable that the contaminated well water was at the bottom of the trouble.

For an account of the present sanitary condition of the Asylum in the matter of water supply, as well as in other respects, the interested reader is referred to the report of Mr. Chase, the Engineer of the Board of Health, which will be found under the head "Reports on Public Institutions."

#### EASTERN HOSPITAL WELLS.

GOLDSBORO, N. C., December 6, 1895.

*R. H. Lewis, M. D., Secretary State Board of Health, Raleigh, N. C.*

DEAR DOCTOR:—I herewith enclose analysis of water from two wells at this Hospital. One well is 8 inches in diameter and 570 feet deep, and the water is remarkably clear and not unpleasant to the taste. The other is a driven well, some 20 feet deep, and has been in use for a number of years. An analysis was made of it by Prof. Venable five years ago; but I thought proper to have another one made, as percolation in the interim might have changed the solid constituents of the water. The deep well referred to has been completed quite recently, and I deem the water an improvement on the water of another deep well bored two or three years ago. I will thank you for any criticism you may make on the water predicated upon the analysis. We purpose using the water for all purposes. Please return these analyses by Monday's mail, as I wish to present them to my directory, which will meet on morning of 12th inst.

Yours very truly,

J. F. MILLER,  
*Superintendent.*

RALEIGH, N. C., December 9, 1895.

*Dr. J. F. Miller, Superintendent Eastern Hospital, Goldsboro, N. C.*

MY DEAR DOCTOR:—Your letter enclosing copies of chemical analyses of the water from your two wells duly received. Chemi-



cally the water from the shallow well is good. That from the deep well, however, has entirely too much free ammonia. At the same time it can hardly be dangerously contaminated. It not infrequently happens that water from deep wells has a high percentage of free ammonia. I cannot understand why there should be so much. Is it possible that the bottle in which the sample was sent was not perfectly clean? I would suggest that you send another sample of the deep well water in a new bottle. I would also suggest that you have a bacteriological examination made of both. It would be made for you by Dr. Anderson, of Wilson, for \$10 each. We cannot afford to pay for it out of our small appropriation, under the circumstances, but you can. I enclose permits which will give you the lower rate. Let me hear from you again.

Very truly yours,

RICH'D H. LEWIS, M. D.,

*Secretary.*

#### ASHEVILLE WELL WATER.

ASHEVILLE, N. C., June 15, 1896.

*Dr. R. H. Lewis, Raleigh, N. C.*

DEAR DOCTOR:—Please inform me if our State Board of Health has the means at its disposal for the bacteriological examination of water? If so I wish to have a culture made for Eberth's Bacillus from a water supply that has developed from two to five cases of typhoid fever annually for the past eight years.

Fraternally yours,

JAMES A. BURROUGHS.

WILSON, N. C., August 1, 1895.

MY DEAR DR. LEWIS:—I have made report to Dr. Burroughs on the Asheville water. Dr. Pate very kindly offered to examine a sample of this water with me, and we have made both a quantitative and qualitative examination. Pate found 1,250 colonies to the cubic centimetre, and I, 1,600; great evolutions of gas, fecal odor, red or pink colonies on lactose-litmus-agar, and indol production. The above shows the water decidedly unfit for use. Pate and I have succeeded in isolating a bacillus that has the microscopic appearance and cultural peculiarities of the *Coli Communis*. But our quantitative examination about established this. I had one potato growth that resembled the typhoid, and every additional test I've yet tried did the same. If I get one or two others I shall believe it to be the Eberth's Bacillus.

Very sincerely yours,

ALBERT ANDERSON.

## WELL IN BURLINGTON.

BURLINGTON, N. C., August 14, 1890.

*Dr. Richard H. Lewis, Secretary State Board of Health,**Raleigh, N. C.*

MY DEAR SIR:—Typhoid fever is prevailing to an alarming extent in one portion of our town. It is of a very malignant and fatal type. It is evident that there must be some local cause for it, and unless it is the drinking water from the wells we cannot tell what the trouble is. I write for a permit to have a bacteriological examination of the water from several of the wells in the locality of the disease.

Very respectfully,

R. A. FREEMAN,

*Superintendent of Health for Alamance County.*

Owing to the small appropriation to the Board, a permit for only one bacteriological could be sent. Permits for two chemical analyses, which are kindly made for the Board free by the director of the State Experiment Station, were also given. For the latter the reader is referred to the tabulated statement of all the chemical analyses for the biennial period, which concludes the subject of water supplies.

## REPORT OF BACTERIOLOGICAL EXAMINATION.

WILSON, N. C., August 24, 1896.

*Dr. R. A. Freeman, Superintendent of Health, Alamance County,  
Burlington, N. C.*

SIR:—I have the honor to submit the following report of the bacteriological examination of the sample of water collected and sent me by you August 19, 1896.

The examination shows about 5,000 bacteria to the cubic centimetre. There was a maximum amount of evolution of gas formation in fermentation tube. On the second day there was coagulation of milk inoculated by the water. The unusually large number of bacteria to the cubic centimetre is due in part to the hot weather, and the sample not being packed in ice and saw dust. From the above tests I would consider the water from which sample was taken unfit for use.

Respectfully submitted,

Duplicate.

ALBERT ANDERSON.

## WELLS SHOWING UNUSUAL FORMS OF CONTAMINATION.

During the year 1896 three samples of water containing living organisms visible to the eye were sent in for examination. That class of work not coming within the scope of either the chemist or the bacteriologist they were submitted to Dr. H. V. Wilson, the Professor of Biology in the State University, who kindly examined for us. His reports on the three specimens appear below.

For the benefit of the reader who is no better acquainted with entomology than the writer, it may not be amiss to roughly describe the general appearance of the several "bugs," "worms" or "things" as they were variously denominated by the gentlemen sending the specimens.

The insects in the water sent by Dr. H. J. Thomas, of Winston, were from a quarter to a third of an inch in length and were very much like miniature shrimp.

Those from the well in Oxford, sent by Mr. A. J. Field, were too minute to make out the details with the unaided eye. Under the microscope, however, they presented more the appearance of a flea than any other familiar insect, having long and evidently strong hind legs. Their resemblance to the flea was completed by their jumping on the surface of the water. They seemed to live on the surface, and in quantities suggested the idea of fine sawdust on top of the water.

The organisms in the specimen from Dr. C. M. Poole, of Craven, were like small worms.

## DR. WILSON'S REPORT.

CHAPEL HILL, November 17, 1896.

MY DEAR DOCTOR LEWIS:—The water from Oxford has not yet turned up. I should like to have it, and will be glad to examine the bugs.

The Winston water reached me. It contained Amphipod crustacea, belonging to the genus *Crangonyx*. Owing to lack of literature I cannot give the species, if indeed it has ever been described.

The bugs, however, differ only in a few points from *Crangonyx tenuis*, a species described as occurring in wells in Middletown, Conn. Another species of the same genus has been found in wells in Indiana. The amphipods are not poisonous, and the *Crangonyx* probably does no harm to the water. Its presence, however, indicates the presence of a good many other forms, and the water may, of course, be indirectly affected by their death.

Without knowing much about the matter practically, I should think the only way to get rid of the beast would be to thoroughly clean the well, say now (at the beginning of the breeding season) and at least once during the summer. The object in cleaning should be not only to get as many of the amphipods themselves as possible, but to destroy their food supply. And therefore every bit of plant-life (green incrustation probably present) should be removed by a thorough scraping—scrapings, of course, must be removed from well.

I should like some more specimens (two or three dozen, if possible) for the University Museum, and would be greatly obliged if you would ask that they be sent me. Am always glad to get "bugs" of any kind.

Yours very truly,

H. V. WILSON.

#### WELL IN OXFORD.

CHAPEL HILL, N. C., March 28, 1896.

MY DEAR DR. LEWIS:—I received yesterday some water from Oxford sent at your request. The sender's name was on the wrapper, but this has been mislaid. The water contained an abundance of "spring-tails" belonging to the genus *Podura*. The spring-tails are very simple and wingless insects. Will you let the gentleman in Oxford know what the bugs are?

Yours very truly,

H. V. WILSON.

#### WELL IN CRAVEN.

CHAPEL HILL, N. C., June 8, 1896.

MY DEAR DR. LEWIS:—The "worms" received from Dr. C. M. Poole and reported as occurring in a well near Craven, N. C., are the larvæ of an insect *Chironomus*, a gnat or midge about the size of and much like the common mosquito. This insect only breeds in stagnant and more or less foul water. Its presence alone in the well would indicate that the water is unfit for use. The people using the water from this well have, according to Dr. Poole, suffered from typhoid, &c. As illustrating the habitat of

the form, I may mention that it is extremely abundant in a small stream below the campus into which the drain from the dissecting hall leads. But it is not found at all in a clear stream opening into the above, even quite near the point where the two streams meet.

The midge is reported as breeding from April into the fall. I have found the larvæ in April.

Yours very truly,

H. V. WILSON.

## CHEMICAL ANALYSES MADE FOR THE BOARD BY THE STATE EXPERIMENT STATION.

NO.	NAMES.	ADDRESS.	Total Solids.	Hardness.	Chlorine.	Carbonate of Lime.	Ammonia Free.	Ammonoid.	LOCATION.
9448	Dr. A. W. Goodwin.	Raleigh, N. C.	41.50	.....	12.50	12.00	138.300	Well E. Hargett Street.	
9260	Dr. W. W. McKenzie	Salisbury, N. C.	10.33	.....	0.41	51.00	656.664	Salisbury Water Works.	
9218	J. L. Williamson	Cerro Gordo, N. C.	8.83	.....	1.16	1.66	666.676	Driven Well.	
9226	F. H. Bain	Goldshoro, N. C.	4.17	.....	1.58	50.04	16	Little River.	
9270	H. E. Knox, Jr.	Charlotte, N. C.	22.41	.....	1.33	1.00	136.688	Artesian Well, Mill Number 1, Hope Mills.	
9436	H. E. Knox, Jr.	Charlotte, N. C.	2.33	1.85	0.17	0.71	170	Tube Well, Sanford.	
9457	A. J. Field.	Oxford, N. C.	11.17	6.10	2.58	4.25	214	Well in Oxford.	
9562	Roanoke Rapids Power Company.	Roanoke Rapids, N. C.	3.63	2.50	0.70	0.90	154	Well in Hamilton Street.	
9745	W. N. Smith.	Tarboro, N. C.	12.08	1.30	0.58	0.17	658.686	Well in Tarboro.	
9792	E. S. Cox.	Jacksonville, N. C.	28.00	14.50	0.90	11.20	34	Well near Jacksonville.	
9881	Dr. R. J. Brevard.	Charlotte, N. C.	4.17	2.30	0.83	1.08	666.046	Charlotte Water Supply.	
9882	H. E. Knox, Jr.	Charlotte, N. C.	9.66	8.40	0.68	6.17	632.048	Artesian Well, Lumberton.	
9919	F. O. Lawson.	Wadesboro, N. C.	120.58	68.30	61.25	56.08	65	Well in Wadesboro.	
9923	Dr. A. H. Tucker.	Henderson, N. C.	3.50	1.10	0.05	0.08	136.212	Hydrant, Railroad Square.	
9924	Dr. W. J. Jones, Jr.	Goldshoro, N. C.	1.25	1.60	0.08	0.00	618.146	Robinson's Drug Store.	
9927	B. F. Keith	Wilmington, N. C.	1.83	1.00	0.23	0.00	642	Well, northern part of city.	
9928	B. F. Keith	Wilmington, N. C.	18.41	6.30	2.00	4.25	612.674	Well, central part of city.	
9929	H. W. Orr	Statesville, N. C.	5.92	1.10	2.66	0.08	111.116	High hill near city.	
9930	H. E. Knox, Jr.	Charlotte, N. C.	5.92	6.50	0.25	4.50	666.066	Well, Lumberton.	
9931	H. E. Knox, Jr.	Charlotte, N. C.	8.78	8.40	0.16	5.92	676.062	Well, Lumberton.	

## MALARIA AND DRINKING WATER.

In the appendix of the last Biennial Report there was printed as a part of the proceedings of the Salisbury Health Conference, a paper read before that meeting by the Secretary of the Board entitled "Drinking Water in Its Relation to Malarial Diseases." It was published in *The Sanitarian* and attracted attention all over the country, receiving editorial consideration in some of the great New York dailies, *The Independent*, the *Baltimore Sun*, the *St. Louis Globe-Democrat*, the *Charleston News-Courier*, and others. By order of the Board it was reprinted in separate form and in 1895 was distributed as one of the health pamphlets.

Wishing to ascertain if any good had been accomplished by it, the following circular letter was mailed to several hundred physicians residing in the eastern section of the State :

RALEIGH, December 7, 1896.

DEAR DOCTOR :—Not quite two years ago the Board distributed throughout the State, particularly the eastern part, a pamphlet on "Drinking Water in its Relation to Malarial Diseases" in which the dangers of surface water, as from the ordinary wells of that section, were set forth, and a change therefrom to cisterns, deep bored wells, or driven pumps advocated. The Board now desires to ascertain if its efforts in that direction have borne fruit. Will you, therefore, kindly answer the following questions in the spaces allowed and return to me as soon as possible ?

1. To what extent, as near as you can come at it, has the suggested change in drinking water taken place in your community ?
- .....
- .....

2. What has been the effect of the change in preventing malarial attacks?

.....

.....

.....

3. Do you think any lives have been saved by making the change?

.....

.....

4. Which has been the most effective, cistern, bored well or driven pump?

.....

.....

5. Have you ever known of a case of hemorrhagic malarial fever or of pernicious malarial fever in a person rigidly and absolutely confining himself to—cistern water? Bored well? Driven pump?

.....

.....

By devoting a few minutes to answering these questions you would greatly oblige the Board of Health, do a service to the people of your State, and advance the cause of science. Will you do it?—and promptly?

Very truly yours,

RICH'D H. LEWIS,

*Secretary.*

Fifty-six replies only have been received up to the time of this writing. The answers in many instances are of such a character as to render their satisfactory tabulation impossible, but the showing, on the whole, is encouraging.



In reply to question No. 1. "To what extent, as near as you can come at it, has the suggested change in drinking water taken place in your community?" nineteen stated that the change had been considerable—from 10 per cent. up to over 50 per cent.; seven that there had been some change; fifteen a little, and nine none. Deep bored wells were mentioned by only two, cisterns, prominently, by not more than half a dozen, the change in most instances being to driven pumps.

To question 2. "What has been the effect of the change in preventing malarial attacks?" seventeen answers were classed as very good, nine good, three slight and five none.

To question 3. "Do you think any lives have been saved by the change?" seventeen answered yes, decidedly; four yes, positively but less forcibly; three yes, doubtfully, and two positively no.

To question 4. "Which has been the most effective, cistern, bored well or driven pump?" in every case where a comparison between them could be made the replies were in favor of cisterns first and bored wells next. It is true that in one instance the writer stated that driven wells were "more satisfactory" than cisterns but in what respect he did not say and it is not unlikely that a want of the proper care of the cisterns, which were very few in number, was at the bottom of the preference for driven pumps.

The replies to question 5. "Have you ever known of a case of hemorrhagic malarial fever, or a pernicious malarial fever in a person rigidly and absolutely confining himself to—cistern water? Bored well? Driven pump?" were all in the negative except six who had known of such cases in persons drinking the water of driven wells. In these cases most of the wells in the community being open surface wells, it is not unreasonable to assume that those attacked did not rigidly and absolutely confine themselves to driven pump water. It should also be said that in a great

many instances the driven wells are quite shallow. From the best information in our possession they do not average more than 25 feet in depth and therefore really furnish surface water, although it must, of necessity, undergo a more thorough filtration through the soil than that of open wells.

Although the evidence as given above is somewhat crude and imperfect, it is plain that marked interest in the subject of better drinking water has been aroused among the people and that very many have been led to make a change in that respect to the great improvement in their health, so far as malarial diseases, at any rate, are concerned, and the saving of many lives, and this is but the beginning of the movement in this direction and in the near future we can look for much greater results. The Board has sown the seed and a richer and richer harvest may be expected every succeeding year.

## THE SERUM DIAGNOSIS TEST FOR TYPHOID FEVER.

The impossibility of making a certain diagnosis in the early stages of many cases of typhoid fever has been a stumbling block in the management of that most serious and wide-spread disease until quite recently. Pfeiffer, of Berlin, discovered the fact that an admixture of the serum of the blood of a person sick with typhoid fever with a pure culture of the bacillus typhosus, which is a motile bacillus, would check their movements in a very few minutes—kill them in other words. Widal, of Paris made the practical application of this fact to the diagnosis of the disease in the human being. Within the past six months Dr. Johnston, the Bacteriologist of the Board of Health of the Province of Quebec, has so simpli-

fied the method that it is now within the reach of any physician. He demonstrated at the meeting of the American Public Health Association, at Buffalo, in September, 1896, that a single drop of the dried blood of a typhoid patient was all that was necessary to enable any bacteriologist having the proper apparatus to make the diagnosis, so that the physician in doubt about a case could have his doubts removed by mailing a drop of the dried blood to the nearest bacteriologist. On his return from the meeting referred to above the secretary lost no time in announcing this important fact to the physicians of the State through the columns of the *Bulletin*. He was much gratified to receive shortly thereafter the following letter from Dr. R. H. Whitehead, who is at the head of the Medical Department of the University.

CHAPEL HILL, October 5, 1896.

DEAR DOCTOR:—We have now a very decent little bacteriological laboratory in running order, which I should like to make useful for other purposes than those of mere instruction alone. It has occurred to me that I might try the new test for typhoid—the serum test. Accordingly I should be glad to have you state in your letters to the superintendents and others, that I am prepared to do the work for them. They should receive a large drop of blood on a bit of clean glass from a puncture of the lobe of the ear, allow it to dry, and then send it to me by mail at once, along with the name of the sender and that of the patient. The doctors should also keep a record of the cases so that we may obtain the clinical history afterwards. Then if you liked I could report the results at the next conjoint meeting of the Board with the society. This test would doubtless help to settle the nature of the “simple continued fever.”

I would be glad to make the laboratory useful in any other way so far as my time will permit.

Yours very truly,

R. H. WHITEHEAD.

The Board at its meeting in Charlotte, on October 15th, expressed its appreciation of Dr. Whitehead's generous offer and accepted it, at the same time instructing the

secretary, as soon as the condition of the treasury would permit, to distribute to all of the physicians in the State a circular letter giving the Doctor's offer and the necessary directions. This has not yet been done, for lack of money to pay the postage.

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## MARITIME QUARANTINE.

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As set forth in the last biennial report, the Board at its annual meeting at Greensboro requested the United States Marine Hospital Service to take charge of and operate the quarantine station at Southport, that Bureau having been authorized by act of Congress to do so. The request was acceded to, and the Government proceeded to install a plant in the way of buildings and appliances adequate to the proper performance of the work of preventing the entrance into the State through that port of infectious diseases of foreign origin. The improvements are now about completed, and although Dr. Curtis, the efficient State quarantine officer, during an incumbency of many years, succeeded, with the extremely limited facilities at his command, in keeping out disease, we can but feel safer with the admirable organization of the Marine Hospital Service, supported by ample appropriations of money, in charge.

On January 26th the following letter, which explains itself, was received:

WASHINGTON, D. C., June 25, 1896.

*Richard H. Lewis, M. D., Secretary North Carolina Board of Health, Raleigh, N. C.*

SIR:—I have respectfully to request that the pilots bringing vessels to Beaufort, N. C., be directed to bring all vessels from foreign ports, and all vessels from the West Indies, Central and

South America and Mexico, coming via a northern United States port, to a convenient place in Beaufort harbor which will be designated by Acting Assistant Surgeon F. M. Clarke, Quarantine Inspector; said vessels to fly a yellow flag and to be considered in quarantine, as per the laws of North Carolina and the United States, until released by the quarantine officer, Dr. Clarke.

Respectfully yours,

WALTER WYMAN,

Supervising Surgeon General, M. H. S.

The above was transmitted to Dr. George N. Ennett, Superintendent of Health for Carteret county, with the request that he give this information to all the pilots of his county. It was further stated that under the laws of the United States the Marine Hospital Service had control of all these matters and that their orders must be obeyed—that they were good orders.

## VITAL STATISTICS.

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While our vital statistics continue meagre, reports being made only by cities and towns, an improvement has been made in accuracy, at least for the year 1896. In December, 1885, the reporting cities and towns were notified that they would be divided for the ensuing year into two classes, according to the reliability of their reports. At the bottom of the blanks furnished was printed, "I hereby certify that this report gives the *whole* number of deaths occurring within the corporate limits during the above month," and the signing of this certificate by the reporter placed the report in the first class. The table of mortuary statistics for 1896 is made up only of such reports. The aggregate population of the cities and towns so reporting is

103,501, 56,205 white and 46,496 colored. The few remarks which follow are based on this table.

The total death-rate for the whites was 14.1 and for the colored 24.5 per thousand. The largest number of deaths was from tuberculosis, the death-rate from that disease alone being 1.67 for the whites and 4.47 for the colored people, the proportion being 1 white to 2.67 colored. While tuberculosis is much more prevalent among the negroes living in the towns, it is becoming more and more common in the country districts, and constitutes, as suggested in our last report, a very serious menace to the race. In that report we also adverted to the fact that, contrary to the usually accepted opinion that the negro was less susceptible to malarial diseases than the white man, our reports showed the death-rate from that disease to be two and half to one, as against the negro. This fact has only been emphasized by the more accurate report for 1896, the proportion being 3.33 to 1 during that year. We also called attention to the fact that the negro appeared to be much less susceptible to diphtheria than the white man, the total number of deaths for the biennial period, 1893-'94, being whites 22, colored 0. In 1896 they were 13 and 1 respectively.

A letter has been sent to the mayors of a number of towns which have not heretofore kept mortuary statistics, or at any rate have made no report thereof, urging upon them the importance of keeping such records, and requesting report of the same to be made to this office. It is hoped that they will respond favorably in order that we may have a larger population on which to base our vital statistics hereafter.

TABLE I.—SHOWING THE COMPARATIVE PREVALENCE OF CERTAIN DISEASES IN THE THREE PHYSICAL DIVISIONS OF THE STATE DURING 1895 AND 1896.

Eastern Division (E.)—Alluvial Plains. Central Division (C.)—Hilly. Western Division (W.)—Mountainous. The figures under the various diseases represent in percentage the proportion of the counties mentioning the presence of the disease in question to the whole number of counties reporting for the month.

		Whole Number of Counties.		Number Counties Reporting.		Diphtheria.		Dysentery.		Influenza.		Malarial Fever.		Malarial Fever, Hemorrhagic.		Malarial Fever, Pernicious.		Pneumonia.		Scarlatina.		Typhoid Fever.																		
January.		E.	1895 1896	36 36	29 29	6.8 3.5	0.0 3.5	17.2 10.7	10.3 14.2	10.3 10.7	3.4 0.0	34.3 35.0	17.2 18.5	13.7 17.8	C.	1895 1896	26 23	25 23	8.0 4.3	4.0 0.0	20.0 30.4	4.0 4.3	0.0 0.0	0.0 4.3	32.0 43.5	8.0 8.7	16.0 30.4	W.	1895 1896	34 30	32 30	9.4 3.3	0.0 0.0	6.2 20.0	0.0 0.0	3.1 0.0	0.0 33.3	28.1 9.4	9.4 33.3	21.9 33.3
February.		E.	1895 1896	36 36	29 28	0.0 7.1	0.0 0.0	31.0 17.8	6.8 17.8	13.7 14.2	0.0 0.0	51.7 32.1	13.7 7.1	10.3 17.8	C.	1895 1896	26 22	25 22	8.0 4.5	0.0 0.0	28.0 22.7	0.0 0.0	0.0 0.0	0.0 0.0	52.0 22.7	8.0 9.1	8.0 22.7	W.	1895 1896	34 31	34 31	2.9 3.2	0.0 0.0	14.7 19.6	0.0 0.0	0.0 0.0	0.0 0.0	35.3 25.8	5.6 3.2	23.2 25.8
March.		E.	1895 1896	36 36	28 26	7.1 3.8	0.0 0.0	35.7 30.7	7.1 23.1	14.3 11.5	3.5 0.0	42.8 53.8	3.6 7.3	10.7 26.9	C.	1895 1896	26 25	25 25	0.0 8.0	0.0 0.0	32.0 12.0	8.0 4.0	4.0 0.0	0.0 0.0	44.0 28.0	0.0 0.0	20.0 16.0	W.	1895 1896	34 26	33 26	0.0 7.6	0.0 0.0	21.2 7.6	0.0 11.5	0.0 0.0	0.0 3.8	30.3 34.6	6.1 0.0	6.1 34.7
April.		E.	1895 1896	36 36	31 27	6.4 0.0	3.2 11.1	19.3 3.7	19.3 35.3	9.6 0.0	3.2 3.7	16.1 7.3	6.4 3.7	19.3 18.4	C.	1895 1896	26 24	25 24	4.0 4.1	0.0 8.3	36.0 4.1	12.0 8.3	0.0 4.1	0.0 4.1	20.0 12.5	4.0 0.0	12.0 29.1	W.	1895 1896	34 32	33 32	3.0 3.1	3.0 9.3	15.1 3.1	6.0 3.1	0.0 0.0	0.0 0.0	18.1 6.2	9.4 0.0	12.1 31.2
May.		E.	1895 1896	36 36	31 28	3.2 3.5	22.5 42.8	3.2 0.0	35.4 42.8	3.2 3.5	6.4 0.0	6.4 0.0	9.6 7.1	22.5 25.0	C.	1895 1896	26 22	26 22	3.8 0.0	15.3 45.4	19.2 0.0	15.3 13.6	0.0 0.0	0.0 4.5	15.3 0.0	0.0 0.0	7.6 40.9	W.	1895 1896	34 32	32 32	3.1 3.1	12.5 28.1	3.1 0.0	15.6 9.3	0.0 3.1	0.0 0.0	3.1 3.1	3.1 0.0	25.0 34.3

TABLE I.—SHOWING COMPARATIVE PREVALENCE.—CONT'D.

			Whole Number of Counties.	Number Com- mities Reporting.	Diphtheria.	Dysentery.	Influenza.	Malarial Fever.	Malarial Fever, Hemorrhagic.	Malarial Fever, Pernicious.	Pneumonia.	Scarlatina.	Typhoid Fever.
June.	E.	1895	36	31	0.0	25.8	0.0	45.1	3.2	3.2	0.0	9.6	29.0
		1896		27	0.0	11.1	66.6	0.0	11.1	0.0	0.0	11.1	55.5
	C.	1895	36	26	3.7	30.7	3.8	16.9	0.0	0.0	0.0	3.8	34.6
		1896		21	4.7	38.1	38.1	0.0	4.7	0.0	4.7	0.0	61.9
	W.	1895	34	33	3.0	15.1	0.0	12.1	0.0	0.0	3.0	6.1	27.2
		1896		32	6.2	25.0	15.6	0.0	0.0	0.0	0.0	3.1	75.0
July.	E.	1895	36	31	3.2	12.8	3.2	54.8	9.6	9.6	0.0	12.8	61.2
		1896		28	7.1	7.1	3.5	75.0	7.1	3.5	0.0	17.8	78.5
	C.	1895	26	26	7.6	34.6	0.0	34.6	0.0	0.0	3.8	11.5	46.1
		1896		32	0.0	0.0	0.0	63.6	0.0	0.0	0.0	0.0	86.3
	W.	1895	34	32	6.2	12.5	0.0	12.5	0.0	0.0	0.0	9.3	56.2
		1896		30	10.0	3.3	0.0	16.6	0.0	3.3	0.0	3.3	83.3
August.	E.	1895	36	30	13.3	10.0	6.6	80.0	13.4	6.6	0.0	16.6	50.0
		1896		26	15.7	0.0	0.0	60.2	30.7	23.1	0.0	0.0	76.9
	C.	1895	26	20	5.0	15.0	0.0	75.0	0.0	0.0	0.0	5.0	85.0
		1896		32	13.6	0.0	0.0	68.1	9.0	4.5	0.0	4.5	95.4
	W.	1895	34	31	9.6	3.2	0.0	19.7	0.0	3.2	0.0	16.1	77.4
		1896		32	18.7	0.0	3.1	28.1	3.1	0.0	0.0	0.0	81.2
September.	E.	1895	36	27	11.1	3.7	0.0	74.1	33.3	11.1	0.0	33.3	44.4
		1896		26	7.6	7.6	0.0	65.4	26.9	7.6	0.0	7.6	53.8
	C.	1895	26	23	4.3	13.0	0.0	56.5	8.6	8.6	0.0	8.6	65.1
		1896		21	19.0	0.0	0.0	61.9	4.7	0.0	0.0	9.5	71.4
	W.	1895	34	32	25.0	3.1	0.0	25.0	0.0	0.0	0.0	18.7	75.0
		1896		30	26.6	3.3	0.0	26.6	6.6	3.3	0.0	13.3	83.3
October.	E.	1895	36	28	10.7	3.5	3.5	75.0	57.1	28.5	0.0	25.0	53.5
		1896		26	7.6	0.0	0.0	73.7	42.3	7.6	0.0	15.3	53.8
	C.	1895	26	24	25.0	4.1	8.3	50.0	4.1	8.3	0.0	12.5	66.6
		1896		21	14.2	0.0	0.0	52.3	4.7	0.0	0.0	9.5	71.4
	W.	1895	34	32	40.6	3.1	12.5	18.7	6.2	6.2	9.3	28.1	75.0
		1896		32	18.7	0.0	6.2	18.7	0.0	0.0	0.0	15.6	78.1
November.	E.	1895	36	27	14.8	3.7	0.0	62.9	29.6	3.7	3.7	25.9	55.5
		1896		28	7.1	3.5	0.0	42.8	17.9	3.5	7.1	17.8	46.4
	C.	1895	26	23	8.6	8.6	0.0	34.7	4.3	13.0	8.6	17.3	43.4
		1896		21	4.7	0.0	9.5	28.5	4.7	4.7	9.5	23.3	42.8
	W.	1895	34	31	29.0	0.0	6.4	9.6	3.2	3.2	9.6	9.6	64.5
		1896		32	6.2	0.0	3.1	15.6	9.3	0.0	9.3	12.5	59.3



TABLE I.—SHOWING COMPARATIVE PREVALENCE.—CONT'D.

Averages for the year.				Whole Number of Counties.	Number Coun- ties Reporting.	Diphtheria.	Dysentery.	Influenza.	Malarial Fever.	Malarial Fever, Hemorrhagic.	Malarial Fever, Fertitious.	Pneumonia.	Scarlatina.	Typhoid Fever.
December.	E.	1895	36	27	3.7	3.7	7.4	25.9	14.8	0.0	22.2	22.2	35.0	
		1896	27	0.0	0.0	7.4	14.8	3.7	3.7	14.8	3.7	25.9		
		C.	1895	26	23	8.6	0.0	30.0	8.6	0.0	0.0	26.1	8.6	43.4
			1896	22	4.5	0.0	13.6	4.5	13.6	4.5	22.2	9.1	27.2	
		W.	1895	34	30	20.0	0.0	23.3	0.0	0.0	0.0	10.0	3.3	50.0
			1896	31	12.9	0.0	20.0	6.4	3.2	3.2	6.4	6.4	38.7	
	1896	E.	36	29.1	6.7	7.4	10.6	41.4	17.7	6.6	14.7	16.3	39.9	
		C.	26	24.2	7.2	11.2	13.6	23.8	1.7	2.5	16.8	7.9	37.3	
		W.	34	32.2	12.6	8.5	8.5	9.9	1.6	1.0	12.2	10.4	44.5	
		E.	36	27.1	5.2	6.6	11.7	38.2	15.0	5.3	11.7	10.6	39.9	
		C.	26	22.2	6.9	7.7	10.0	26.1	3.0	1.9	11.9	6.1	49.6	
		W.	34	30.8	10.0	6.6	8.9	11.6	2.1	1.1	9.9	4.8	54.8	
	1895	State.	96	28.5	8.8	9.0	10.9	25.0	7.0	3.4	14.6	11.5	38.6	
	1896	State.	96	26.7	7.3	7.3	10.2	25.3	6.7	2.8	11.2	7.2	48.1	



TABLE No. II.—SHOWING THE COMPARATIVE PREVALENCE OF DISEASE—CONTINUED.

(Of the 96 Counties in the State the number sending reports each month is stated at the head of the columns.)

DISEASES.	NUMBER OF COUNTIES WHICH MENTION THE PRE- SENCE OF EACH DISEASE EACH MONTH.												
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	
	1895.	88	89	87	86	89	80	89	83	82	84	81	80
	1896.	81	79	81	82	82	79	80	80	77	75	79	80
Typhoid Fever. . . . .	1895.	15	13	10	13	17	27	49	56	51	55	45	35
	1896.	22	18	20	22	28	52	66	67	54	54	41	25
Varicella.....	1895.	2											1
	1896.			2		2			1				
Whooping Cough. . . . .	1895.	8	12	12	13	9	10	19	18	18	14	17	12
	1896.	19	20	21	20	22	26	21	21	16	14	17	12

TABLE NO. III.—TABLE OF MORTALITY REPORTS FROM TOWNS FOR YEAR ENDING 4 DECEMBER 31, 1895.

TOWNS AND REPORTERS.	DEATHS BY MONTHS.												(Grand Total. Races.	DEATH-RATE (ANNUAL) PER 1,000, BY MONTHS.												RATE FOR YEAR.		POPULA- TION.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		By Races.	By Towns.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
Asheville.....	W	10	2	13	9	5	9	10	6	13	19	5	11	117	15	0	3	0	19	5	12	0	7	5	13	5	15	0	13	9	12	8,000	12,000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																									
Dr. E. C. Starnes.....	C	4	5	2	3	2	8	1	4	5	1	0	1	36	12	0	15	0	6	24	0	3	0	12	0	15	0	3	0	0	3	0	9	4,000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
Charlotte.....	W	11	8	15	10	17	16	16	13	13	11	16	154	325	14	7	16	7	10	22	0	13	22	7	21	3	16	3	14	4	12	2	17	10,855	19,651																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Fred Nash, City Clerk.....	C	12	6	3	14	12	20	16	16	24	24	9	18	171	24	0	12	0	6	28	0	24	0	40	0	32	2	33	7	31	6	12	3	24	8,716																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																							
Durham.....	W	1	6	1	4	2	2	3	5	4	2	5	1	39	2	7	16	0	2	7	10	7	5	3	8	0	13	3	10	7	5	13	1	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE NO. III.—TABLE OF MORTALITY REPORTS FOR 1895, ETC.—CONTINUED.

TOWNS AND REPORTERS.	DEATHS BY MONTHS.												Grand Total.	By Races.	By Towns.	POPULA- TION.	
	Races.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.					December.
Lenoir.....	W	0	0	0	0	1	3	0	1	1	1	1	1	6	32	800	1,100
Dr. A. A. Kent.....	C	0	0	0	0	0	0	0	0	0	0	0	0	3	300		
Lexington.....	W	0	2	1	1	0	0	0	0	0	0	0	0	5	1,800	2,100	
Dr. R. L. Payne.....	C	0	0	0	0	0	0	0	0	0	0	0	0	0	300		
Marion.....	W	3	0	0	1	0	1	2	1	1	1	1	1	10	700	1,400	
Dr. B. A. Cheek.....	C	0	0	1	0	0	0	1	0	0	0	0	0	2	300		
Dr. G. J. White.....	Grand Total.	3	0	1	0	1	2	1	1	1	1	1	1	12			
Monroe.....	W	1	1	2	0	0	3	1	1	1	1	0	1	11	34	1,800	2,400
Dr. J. M. Blair.....	C	1	1	2	1	0	1	2	1	1	1	1	1	13	600		
Oxford.....	W	0	1	1	1	2	1	3	0	0	1	2	1	14	42	1,600	3,000
Dr. W. O. Baskerville.....	C	1	1	1	3	5	1	3	1	5	3	0	0	27	1,400		
Pittsboro.....	W	0	0	0	0	0	0	0	0	0	0	0	0	0	350	600	
Dr. L. A. Hanks.....	C	0	0	0	0	0	0	0	0	0	0	0	0	0	250		
Raleigh.....	W	14	11	13	6	8	15	12	20	17	13	10	10	151	314	8,300	16,000
Dr. James McKee.....	C	11	11	15	10	16	18	16	18	11	12	15	163	5,300			
Rockingham.....	W	0	2	2	1	0	3	0	1	5	3	2	1	19	23	1,200	1,750
Dr. J. M. Covington.....	C	0	1	0	0	0	1	0	0	0	1	1	4	11	430		
Dr. W. H. Steele.....	Grand Total.	5	2	3	1	6	21	35	28	43	34	25	25	114			
Rocky Mount.....	W	1	0	1	2	1	2	0	0	1	1	1	0	10	20	1,800	2,400
Dr. G. L. Wimberley.....	C	0	0	1	1	0	0	0	0	0	0	0	0	10	600		
Salmon.....	W	5	4	6	4	2	3	7	2	5	7	2	2	49	5	3,042	4,254
Dr. E. Keelhu. H. O.....	C	0	1	2	2	1	1	1	0	0	0	1	0	9	342		

TABLE NO. III.—TABLE OF MORTALITY REPORTS FOR 1895, ETC.—CONTINUED.

TOWNS AND REPORTERS.	DEATHS BY MONTHS.												Grand Total.	DEATH-RATE (ANNUAL PER 1,000, BY MONTHS.												RATE FOR YEAR.	POPULA- TION.
	Races.	January.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		By Races.	By Towns.	Total.											
Salisbury..... Dr. John Whitehead.	W	9	11	6	3	4	2	4	6	3	3	3	4	45	38	30	8	3	1	3	3,500						
	C	3	3	3	3	1	5	4	3	3	3	3	3	37	33	24	0	16	0	16	1,300						
Scotland Neck..... Mayor J. A. Perry.	W	0	1	0	1	1	1	1	2	0	0	0	0	9	31	0	17	1	0	15	575						
	C	0	1	0	1	1	1	1	1	0	0	0	0	9	31	0	20	0	0	21	425						
Southport..... Dr. A. Galloway, C. C.	W	0	1	0	0	3	1	1	2	0	1	0	0	9	16	0	16	0	0	16	750						
	C	0	0	0	0	0	0	1	1	0	1	0	0	7	11 mos.	0	0	0	0	36	450						
Statesville..... Dr. W. J. Hill.	W	3	1	3	2	1	1	0	0	1	3	1	15	19	14	4	6	0	44	4	2,500						
	C	0	1	0	0	1	0	0	0	0	0	0	0	22	19	0	22	0	0	0	1,000						
Tarboro..... Dr. Donald Williams.	W	1	1	2	0	3	2	3	1	1	1	2	21	38	9	3	28	1	0	37	1,300						
	C	0	2	1	0	1	0	1	3	1	2	0	21	38	9	3	28	1	0	37	1,200						
Warrenton..... Dr. P. J. Mason.	W	0	1	0	1	0	0	0	0	0	0	0	0	3	8	0	11	0	11	0	1,000						
	C	0	0	2	1	0	0	0	0	0	0	0	0	5	9 mos.	0	0	36	9	36	600						
Washington..... Dr. J. C. Rodman.	W	3	1	2	3	5	6	3	3	6	5	4	43	99	12	0	4	0	12	0	34,000						
	C	1	9	1	4	6	7	8	0	10	6	4	56	11 mos.	1	8	13	2	4	19	2,500						
Dr. Joshua Taylor.	C	1	9	1	4	6	7	8	0	10	6	4	56	11 mos.	1	8	13	2	4	19	2,500						







TABLE NO. IV.—TABLE OF MORTALITY REPORTS, FOR 1896, ETC.—CONTINUED.

[illegible]

TABLE NO. IV.—TABLE OF MORTALITY REPORTS, FOR 1896, ETC.—CONTINUED.

TOWNS AND REPORTERS.	DEATHS BY MONTHS.												DEATH RATE (ANNUAL) PER 1,000, BY MONTHS.												RATE FOR YEAR.		POPULA- TION.
	Races.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	By Races.	By Towns.												
<b>WASHINGTON</b> .....	W	5	3	4	4	5	5	2	3	4	10	20	0	12	0	16	0	12	0	14	500						
Dr. Joshua Tryde .....	C	3	6	4	4	6	8	8	6	0	5	14	4	28	8	38	4	38	4	2,500							
<b>WELDON</b> .....	W	2	2	0	1	0	0	2	1	0	1	3	1	13	3	34	3	15	1	0	750						
Dr. J. T. Gooch, Mayor .....	C	0	3	1	1	1	1	3	3	2	2	3	0	21	0	16	0	48	0	250							
<b>WILMINGTON</b> .....	W	15	13	12	19	11	9	15	14	12	8	11	16	161	469	22	5	25	3	11	1,450						
Dr. J. C. Shepard .....	C	16	15	21	22	20	20	27	13	32	28	15	20	308	31	0	13	8	28	0	9,000						
<b>WILSON</b> .....	W	1	2	1	6	2	2	6	6	1	2	3	0	35	60	19	2	9	6	4	13,000						
Dr. N. Anderson .....	C	5	3	7	3	3	2	1	1	3	2	1	1	15	18	0	12	0	18	0	25,000						
<b>WINSTON</b> .....	W	5	4	3	4	5	12	5	4	5	13	1	5	71	352	11	5	9	2	11	5						
Dr. John Byrum .....	C	15	13	15	19	17	13	16	17	9	0	18	5	181	37	5	49	6	37	5	5,200						
																					1,800						

N. B.—In order to assure as far as possible the accuracy of the mortality statistics of the cities and towns the reporters were required during the year 1896 to sign this certificate: "I hereby certify that this report gives the whole number of deaths occurring within the corporate limits during the above month." In the above table no city or town is included to each monthly report of which the said certificate was not appended.

TABLE NO. V.—SHOWING CAUSES OF DEATH FOR YEAR ENDING DECEMBER 31, 1895.

TOWNS.	RACES.	POPULATION.		Annual Death Rate per 1,000.	CAUSES OF DEATH.												REMARKS.							
		By Races.	Total.		By Races.	Total.	Typhoid Fever.	Scarlet Fever.	Diphtheria.	Whooping-cough.	Measles.	Pneumonia.	Consumption.	Brain Diseases.	Heart Diseases.	Neurotic Diseases.	Diarrhoeal Diseases.	All Other Diseases.	Accident.	Violence.	By Races.	Total Deaths.	Deaths under 5 years.	Still Born.
Asheville.....	{ White..... Colored.....	8,000 4,000	12,000	13.9 9.0	5.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	1.0 0.0	13.0 3.0	3.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	111 36	147	13 10	9 6
Charlotte.....	{ White..... Colored.....	10,855 8,756	19,611	14.2 19.4	15.0 10.0	3.0 0.0	3.0 1.0	3.0 1.0	1.0 0.0	13.0 15.0	4.0 0.0	13.0 0.0	12.0 20.0	0.0 0.0	41.0 19.0	41.0 51.0	2.0 5.0	0.0 0.0	0.0 0.0	0.0 0.0	235 171	265	58 51	3 12
Durham.....	{ White..... Colored.....	4,000 2,000	6,000	9.5 3.5	4.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	4.0 0.0	6.0 0.0	3.0 1.0	4.0 1.0	0.0 0.0	9.0 1.0	6.0 2.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	39 4	46	12 0	4 0
Fayetteville.....	{ White..... Colored.....	3,000 2,000	5,000	14.3 22.5	4.0 0.0	1.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	5.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	6.0 6.0	6.0 16.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	43 45	88	8 6	6 6
Goldsboro.....	{ White..... Colored.....	3,500 1,500	5,000	8.4 25.9	2.1 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	6.0 3.0	10.0 16.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	31 44	75	8 1	0 0
Henderson.....	{ White..... Colored.....	2,250 2,000	4,250	18.5 15.5	12.0 0.0	0.0 0.0	1.0 0.0	1.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	1.0 0.0	0.0 0.0	0.0 0.0	4.0 12.0	1.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	13 35	50	12 0	0 0
Hillsboro.....	{ White..... Colored.....	400 300	700	12.5 33.3	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	4.0 4.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	5 7	12	0 0	0 0
Lenoir.....	{ White..... Colored.....	800 300	1,100	11.2 10.0	1.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 1.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	9 3	12	3 0	0 0
Lexington.....	{ White..... Colored.....	1,800 300	2,100	3.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	1.0 0.0	1.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	7 0	7	0 0	0 0
Marion.....	{ White..... Colored.....	700 300	1,000	15.6 7.3	3.0 1.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	1.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 0.0	10 12	22	0 0	1 1

TABLE No. V.—SHOWING CAUSES OF DEATH FOR 1895, ETC.—CONTINUED.

TOWNS.	RACES.	POPULATION.		Annual Death Rate per 1,000.	CAUSES OF DEATH.												Total Deaths.	Deaths under 5 years.	REMARKS.					
		By Races.	Total.		Typhoid Fever.	Malaria Fever.	Diphtheria.	Whooping cough.	Pneumonia.	Consumption.	Brain Diseases.	Heart Diseases.	Neuritic Diseases.	Diarrhoeal Diseases.	All Other Diseases.	Accident.				Suicide.	Violence.	By Races.	By Towns.	
Monroe	White..... Colored.....	1,800 600	2,400	6.1 21.7	10.0	0	0	0	0	0	0	1	0	0	0	0	0	11	24	0	0	0		
Oxford	White..... Colored.....	1,000 1,400	3,000	8.7 20.0	11.0	0	0	0	0	0	3	1	0	1	0	4	13	1	0	0	0	0	0	
Pittsboro	White..... Colored.....	350 250	600	0.0 0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Raleigh	White..... Colored.....	8,500 7,500	16,000	17.8 21.7	10.1	4	2	0	1	0	17	14	16	2	3	11	15	0	1	151	314	42	43	
Rocky Mount	White..... Colored.....	1,800 600	2,400	5.5 16.7	8.3	0	0	1	0	0	3	0	0	0	0	1	2	0	1	0	0	0	0	0
Salem	White..... Colored.....	3,942 342	4,284	12.4 26.3	13.5	1	0	0	0	0	3	5	0	6	0	5	12	0	0	49	5	20	1	1
Salisbury	White..... Colored.....	3,500 1,500	5,000	12.9 23.3	16.6	2	0	0	0	0	4	5	0	5	0	9	16	0	0	45	33	2	1	1
Scotland Neck	White..... Colored.....	775 425	1,200	11.6 21.2	15.0	1	0	0	0	0	0	1	1	2	0	3	4	0	0	9	18	3	0	0
Southport	White..... Colored.....	750 450	1,200	12.0 15.5	13.3	0	0	0	0	0	0	2	0	2	0	1	3	1	0	9	16	1	1	1
Statesville	White..... Colored.....	2,500 1,000	3,500	6.8 2.0	5.4	0	0	0	0	0	1	0	0	0	0	2	10	0	0	15	19	1	1	1

TABLE NO. V.—SHOWING CAUSES OF DEATH FOR 1895 ETC.—CONTINUED.

TOWNS.	POPULATION.		Annual Death Rate per 1,000.	CAUSES OF DEATH.												REMARKS.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											
	By Races.	Total.		By Races.	Total.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
					Typhoid Fever.	Scarlet Fever.	Diphtheria.	Whooping-cough.	Pneumonia.	Consumption.	Brain Diseases.	Heart Diseases.	Neurotic Diseases.	Pharyngeal Diseases.	All Other Diseases.			Accident.	Violence.	By Races.	Total Deaths.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
	White.	Colored.		15	3	3	1	0	0	0	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

\* Nearly all the deaths from consumption were of visitors.

Deaths under 5 years.

Total Deaths.

By Towns.

By Races.

Violence.

Accident.

All Other Diseases.

Diathetical Diseases.

Neurotic Diseases.

Heart Diseases.

Brain Diseases.

(Consumption.

Pneumonia.

Measles.

Whooping-cough.

Diphtheria.

Malaria Fever.

Scarlet Fever.

Typhoid Fever.

Total.

By Races.

Total.

Still born.

4 11 months, Dec.

1 omitted.

0 8 months, Feb.

0 Aug., Oct. & Dec. omitted.

0 0 months, June

0 omitted

TABLE No. V.—SHOWING CAUSES OF DEATH FOR 1895, ETC.—CONTINUED.

TOWN.	RACE.	POPULATION.		Annual Death Rate per 1,000.	Total.														REMARKS.						
		By Races.	Total.		By Races.	Total.	Typhoid Fever.	Scarlet Fever.	Maternal Fever.	Diphtheria.	Whooping cough.	Pneumonia.	(Consumption.	Brain Diseases.	Heart Diseases.	Neurotic Diseases.	Diarrhoeal Diseases.	All other Diseases.		Accident.	Violence.	By Races.	Total Deaths.	Deaths under 5 years.	Still Born.
Warrenton.	White.	1,000	1,600	4.0	6.5	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	8	0	0	9 months, Aug., 0 Sept., N. Oct., omitted.
	Colored	600		11.1		0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	5	0	0	0
Washington.	White.	35,000	55,000	15.6	19.6	0	1	0	0	0	0	12	27	10	5	0	0	13	2	0	43	99	15	15	0.11 months, Oct., 2 omitted.
	Colored	25,000		24.4		0	5	0	1	0	0	5	5	5	0	0	0	35	4	0	56	106	33	33	0.11 months, Oct., 2 omitted.
Weldon.	White.	700	1,150	3.1	16.5	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	22	0	0	0.11 months, 0 Aug., omitted.
	Colored	450		29.1		0	0	1	0	0	0	1	3	0	1	0	4	8	2	0	20	22	5	5	0.11 months, 0 Aug., omitted.







TABLE NO. VI.—SHOWING CAUSES OF DEATH FOR 1896, ETC.—CONTINUED.

TOWNS.	RACES.	POPULATION.		Annual Death Rate per 1,000.	CAUSES OF DEATH.																Total Deaths.		
		By Races.	Total.		Typhoid Fever.	Scarlet Fever.	Malarial Fever.	Diphtheria.	Whooping-cough.	Measles.	Pneumonia.	Consumption.	Brain Diseases.	Heart Diseases.	Nervous Diseases.	Diarrhoeal Diseases.	All Other Diseases.	Accident. Suicide.	Violence.	By Races.	By Towns.	Deaths under 5 years.	Still Born.
WELDON	White.....	700	1,450	18.6	23.4	0	1	1	0	0	0	1	0	0	0	0	0	1	0	1	43	4	1
	Colored.....	750		28.0		1	1	0	0	0	1	1	0	0	0	0	0	1	0	0	21	34	9
WILMINGTON...	White.....	9,000	22,000	17.8	7	0	10	0	0	4	10	24	14	9	1	24	53	5	0	164	469	52	22
	Colored.....	13,000		23.4	11	0	10	0	0	8	15	43	5	16	1	55	118	12	0	308	117	16	
WILSON	White.....	2,500	4,500	14.0	13.3	1	0	0	0	0	3	5	0	0	2	1	17	1	0	35	60	15	5
	Colored.....	2,000		12.0	0	0	1	0	0	0	0	1	0	1	1	2	11	0	0	25	60	15	4
WINSTON.....	White.....	5,200	10,000	15.6	10	0	0	0	0	0	6	12	3	6	0	1	19	1	0	71	252	26	8
	Colored.....	1,800		37.7	6	0	0	0	0	0	30	45	0	0	0	1	30	46	3	0	181	58	21
Total 24 Towns	White.....	22,322	126,785	14.5	19.1	70	34	14	13	38	90	101	84	69	53	132	354	15	4	2,104	2,425	324	75
	Colored.....	51,463		25.3	64	0	17	7	17	53	119	220	66	87	21	151	469	29	0	2,137	2,425	487	134
Grand Total		126,785			134	70	51	28	30	91	209	321	150	156	74	283	823	41	4	4,242	.....	805	209

N. B. In order to assure as far as possible the accuracy of the mortality statistics of the cities and towns the reporters were required during the year 1896 to sign this certificate: "I hereby certify that this report gives the *whole* number of deaths occurring within the corporate limits during the above month." In the above table no city or town is included to each monthly report of which the said certificate was not appended.

## THE MONTHLY BULLETIN.

This publication of the Board, the editing and preparation of which is one of the duties of the Secretary, has appeared with regularity during the past two years. Besides recording the monthly reports of the county superintendents of health, the mortuary reports from cities and towns, the condition of the jails and county homes, etc., it is utilized as a medium of instruction in matters relating to hygiene and for the purpose of encouraging interest in the subject. As showing the kind of work done on this line, some extracts from the issues of the last biennial period are appended.

## PUBLIC SENTIMENT AND OUR HEALTH AND MEDICAL LAWS.

Those who have had most at heart the preservation in their integrity of the excellent laws now upon the statute books of our State bearing upon the subjects of sanitation and the practice of medicine have always felt more or less trepidation upon the assembling of each Legislature lest they should be abolished or fatally amended. This feeling of anxiety has arisen from the fact that the laws being of a more or less technical character, and therefore hard to explain to laymen, especially by any one not thoroughly familiar with their *raison d'être* and their practical working, any general discussion of them would be liable to result in injudicious and hurtful changes. But the main trouble has been the indifference of the legislators on these subjects because of the want of interest in them manifested by their constituents. Such being the general attitude of this body, it is easy to understand how little resistance might be made to a bill urged by a member of more or less influence and popularity. Almost invariably the motive for the introduction of the amendment or the special act practically setting aside the law, in part, at least, is to accommodate some individual constituent of the member, and this, too, with an utter disregard of the effect upon the State at large. It is the work of the mere politician as contradistinguished from the statesman, but has not met the sympathy or support of the majority. We do not wish to be understood as complaining of our Legislatures. On the contrary, we have every reason to be grateful when we call to mind the fact that we have the best medical license law in the country, and have had it longer than any

other State, and health laws in advance of public sentiment. Our object has been to set forth the reasons for the feeling of anxiety referred to in the beginning.

When the political revolution of last fall occurred, and a new element came into power, our fears were naturally increased. But they proved to be entirely groundless. It was soon developed that our laws had many and powerful friends in each of the three parties represented. Among these many friends we feel that it would not be making any invidious comparison to particularly mention our County Superintendent of Tyrrell, Dr. Ab. Alexander, who was the representative from that county, and who, as chairman of the Committee on Public Health of the House, proved indeed a faithful sentinel upon the watch-tower. Quite a number of bills inimical to our medical and health laws were introduced, but if we were not misinformed only one—a special act authorizing two men to register who had failed on their examination for license—passed, and that so amended as to permit their registration as soon as they obtained license—a privilege they possessed before the Legislature met.

The occurrences which were specially gratifying and reassuring as showing the state of public sentiment in favor of our laws, were these :

A bill was introduced requiring our Board of Medical Examiners to issue license to any one presenting a license from any other State. To those not familiar with the fact that the States with whom we would be willing to reciprocate in this matter could be counted on the fingers of one hand and leave digits unused, this was a very fair sounding bill. It was withdrawn from the Committee on Public Health and referred to the Judiciary Committee, which was composed of not lawyers only, but farmers and men following other vocations. When it came up, we were told by a member of the committee, it was reported adversely, and that, too, by a very large majority. And he added that the Populist members were more outspoken in their opposition to any change whatever in our medical license law than any others. The significance of this lies in the fact that those belonging to the People's party were in large part farmers themselves, and represented the most conservative element in every population, the element that is always most difficult to induce to take hold of any new thing.

Again, a bill to repeal the act relating to the Board of Health was introduced by the most prominent farmer in either House, himself a member of the majority, and the same committee promptly recommended that "this bill do *not* pass." Now while the leading men in the Legislature had had their attention called to the inadvisability of having our medical and health laws

amended in any particular, and the desire had been expressed that any attempts in that direction should, if possible, be defeated in the committee in order to avoid a general discussion for the reasons set forth above, no outside friend of our laws appeared before the Judiciary Committee in either of the two instances just mentioned. In other words, the committee did not need any urging or persuading to continue to the people the protection afforded under our present statutes; they did it of their own motion.

Another instance, still more reassuring, as showing the temper of the whole House of Representatives, was this: A bill to regulate the practice of medicine in Stokes and Surry counties, introduced doubtless in the interest of a number of illegal practitioners in that locality, was reported to the House favorably by the Committees on Propositions and Grievances, but notwithstanding the favorable report it was promptly tabled. A similar bill applying to the whole State was also laid upon the table in the Senate.

The statement of facts made above warrants, in our opinion, the belief that we at last have the people with us—that they realize and appreciate the value and importance of the laws enacted for the purpose of protecting their health and lives. If our confidence is not misplaced we can venture, when the Legislature meets again two years hence, to ask for still further improvements in our legal machinery.

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### PREVENTION OF TUBERCULOSIS.

In our remarks on "Malaria and Drinking Water Again" in our last issue we stated that a paper on that subject in the Appendix to the Biennial Report would be reprinted in pamphlet form for general distribution. Another paper, which also appears in the Appendix, on the Prevention of Tuberculosis, by Dr. S. Westray Battle, of Asheville, has also been reprinted in an edition of 10,000 for the same purpose. To those who enjoy the privilege of knowing Dr. Battle it is unnecessary to say that it is both valuable and interesting. We desire its widest possible circulation and would be glad to have the names of all those who desire a copy, and particularly of those who can and will assist in distributing it. If it would be more convenient send us the names and addresses of everybody you can think of who would be interested.

## INFECTIOUSNESS OF MILK.

We have recently received from the Secretary a copy of a report made to the Trustees of the Massachusetts Society for Promoting Agriculture on the infectiousness of milk, especially that from tuberculous cows with no lesion of the udder, by Dr. Harold C. Ernst, Bacteriologist of the Harvard Medical School. The results of Dr. Ernst's investigations are so interesting and valuable that, inasmuch as his report will hardly come under the eye of most of our readers, we feel that we will be doing them a pleasing service in giving them a summary of it, short and imperfect as it must be from want of space. After certain preliminary remarks he says:

"The desire of the committee was to determine whether or not the milk derived from tuberculous cows might contain the infectious material of the disease, and in this way become dangerous when used as an article of food. And this question was of necessity to be divided into two parts: (1) Whether this infection, if it existed, was confined to cases in which there was actual disease of the udder, and (2) whether it might exist in cases in which the udder was apparently or actually healthy, but the disease existed in other parts of the body.

"In regard to the first part of the question plain common sense showed that the danger of infection was a real one, and besides this, there existed at the time sufficient experimental *data* to prove the fact, so that there is very little dispute that, under the circumstances, milk should not be used for food, certainly in an uncooked condition. Evidence since then in the same direction has constantly accumulated, and now there is hardly a dissenting opinion that milk from cows with tuberculosis of the udder should be condemned for food.

"Upon the second point, however, as to whether the milk from cows with tuberculosis, but not of the udder, might be dangerous, there was a great diversity of opinion, and almost no experimental evidence upon which to base what opinion there was. It was in this direction, therefore, that it was especially desirable to obtain evidence, and after considerable discussion it was decided that the main line of experiment should be so conducted that this point might be decided. In this, as in everything else, it is to be remembered that one piece of positive evidence obtained under proper conditions is worth many negative results, and it is for this reason that so much value may be attached to the results which have been obtained. These were published in an incomplete form and have been widely disseminated. \* \* \* It is unquestionable that they have had much influence in moulding public opinion in this matter, and at least one direct result has

been the inspection of the herds of cattle in New York by the Board of Health of that State.

"The work, then, was undertaken with this special end in view—to determine *whether the infectious element of tuberculosis ever existed in milk from tuberculous cows whose udders were apparently healthy*, and was prosecuted under the following headings: 1. *A careful and persistent microscopic examination of the milk from such cattle.* 2. *Inoculation experiments with such milk.* 3. *Feeding experiments with the same milk.* In addition to these three main lines of investigation there was also undertaken: 4. *Similar investigation of the milk supply of Boston*, and 5. *The gathering of as much evidence as possible from medical men and veterinarians as to cases of probable infection through tuberculous milk that had come under their observation.*"

These investigations were made with extreme carefulness, every precaution being taken to have them as free from doubt as possible.

#### I.

*"Cover-glass examinations of milk from cows affected with tuberculosis, but, so far as the best veterinary examination could determine, with no disease of the udder."*

A summary of the results of this line of investigation, as given in Table I., is as follows:

"There were 121 examinations of milk and cream made, the specimens coming from 36 different animals. The bacilli of tuberculosis were found in one or more cover-glasses upon 19 different occasions.

"These 19 positive results were obtained from 12 different animals, and the bacilli were found in about equal proportion in the milk and the cream; they were seen more than once in milk from the same cow, at different examinations, 6 times. The bacilli were actually seen, therefore, in specimens from one-third (33 per cent.) of the animals examined. That these animals were actually affected with tuberculosis, and that the udder was free from disease, was proven in all possible cases by careful *post-mortem* examinations. These were conducted upon 20 out of 36 animals shown in Table I.

#### II.

*"Inoculation Experiments upon Animals."*—The animals used were guinea-pigs and rabbits. The results of this work are set forth in detail in Tables II. and III. and are summarized as follows: "There were 88 guinea-pigs inoculated with milk from 15 different cows; tuberculosis was found in 12, and these results came after the use of milk or cream from 6 different animals. \* \* \*

Ninety-five rabbits were used for the same purposes and under the same conditions as were the guinea-pigs. Of these rabbits 5 were for various reasons useless for the purposes of the investigation, leaving 90 which were subjected to full examination. For these 90 animals milk from 19 different cows was used one or more times, and tuberculosis was found in 6 animals inoculated with milk from 4 different cows. These results show a less proportion of apparent infection of milk as demonstrated by the inoculation experiments than appeared to be the case in the microscopic examinations. But this difference, even granting that they were *all* the results of the inoculations, is no more than might be expected and explained by causes beyond control."

### III.

"The third line of experiment was in feeding the milk from tuberculous cows and healthy udders to different series of animals. Here, again, the greatest precautions were taken against outside infection, and it is believed that these were as free from sources of error as it is ever possible to make such experiments. They were carried on upon rabbits, pigs and calves, and the statement of the experiments is shown in Tables IV, V and VI." Summaries of these tables are as follows:

"*Milk-feeding Experiments upon Rabbits.*—There were used 48 animals, with positive results (tuberculosis) in two, and both of these animals were fed upon milk from cow E: No. 12, one nodule in lung after 31 days; No. 28, one nodule in liver after 97 days. This is of course a very small proportion of positive results, but the following table shows a very different condition of affairs, that is especially striking for the reason that pigs are not believed to be unusually susceptible to tuberculosis under ordinary conditions.

"*Milk-feeding Experiments upon Pigs.*—Twelve healthy animals were used with positive results (demonstration of the bacilli under the microscope) in five. In two others nodules presenting the gross appearance of tuberculosis were found, but the material was not saved for microscopic examination. In any case nearly 50 per cent. of the animals were shown to be tuberculous.

"*Milk-feeding Experiments upon Calves.*—For the purposes of the third series of feeding experiments calves were bought as young as possible, and from as healthy parentage as could be found. There were 25 calves used in this series of experiments, but of these 4 are to be excluded from the count, leaving 21. Of these 21 animals 8, or over 33 per cent., were shown to be tuberculous.

"It is of course true that pigs and calves, that drink milk much

more freely than do rabbits, are more susceptible to infection by the gastro-intestinal tract, and that this may explain the far greater proportion of positive results in these two species of animals.

"*Examination of Cows Used for Experiment.*—Twenty-three cows were used for the feeding experiments, and in not one of them did the most careful macroscopic and microscopic search show any sign of tuberculosis of the udder except in one, and in this case a single giant cell, containing one bacillus, was found in one section, and no other indication of tuberculosis anywhere else in the udder.

"An exceedingly interesting piece of evidence as regards the hereditary nature of tuberculosis is found in the history of 19 calves born of the tuberculous cows with healthy udders. Of these 19 calves, all killed within 6 days after birth, not one showed any detectable evidence of tuberculosis, and a most careful search was made in all cases. So that this certainly seems to point away from any very active transmission of tuberculosis from the cow to its offspring."

#### IV.

"*Milk Supply of Boston.*—As an interesting corollary to the work already detailed a series of microscopic examinations and inoculation experiments were made with milk taken at random from the mixed supply of the city of Boston. \* \* \* There were 56 examinations made of the milk and cream from 33 samples, with the result of demonstrating the presence of the bacilli of tuberculosis once. Twenty-five rabbits were inoculated with this milk, mixed, with the development of tuberculosis in three.

"Of course these results, obtained in milk from a mixed source are not as conclusive upon the especial point toward which the main line of investigation was directed—as to the presence of the bacilli of tuberculosis in milk from cows with healthy udders—but they certainly tend to demonstrate that there may be this infectious element in any milk supply from uninspected cattle."

#### V.

"The last of the lines in which investigation was made was to endeavor, if possible, to obtain clinical reports of cases of transmission through milk from mother to offspring. \* \* \* A circular was sent out to about 1,800 medical and veterinary gentlemen, in an attempt to discover any clinical cases bearing upon the subject at hand." To this circular replies were received from 937 physicians, of which 19 were positive as to the transmission and 16 suspicious. "Counting all the positive and suspicious cases together, there are 35, and the percentage of those who have



seen cases in which their suspicions have been aroused in this direction is 3.7—a result that is as unexpected as it is surprising in its size, if one takes into consideration the difficulties surrounding the question, and the newness of the subject.” Fifty-four replies were received from veterinarians, which gave a percentage of 42.59 *plus*. “Such a percentage is startling in its size, until one remembers the greater facilities that veterinarians have for observing such cases and their origin, when it does not seem so much out of the way—granting that milk may be the vehicle for the disease that the experimental evidence offered in this paper tends to show that it is.

“Combining the statistics obtained from the two sources, it appears that there were 991 answers received to the circular letter that should be counted, and that among these there were 58 gentlemen who have seen, or suspected, the existence of such cases as were inquired about, giving a percentage of 5.84 *plus*, which seems to be somewhat remarkable for the reasons already given.”

While the facts above given are extremely interesting, suggestive and valuable, we trust that our readers will not forget the plain, old-fashioned, every-day infectiousness of milk, with which we are all familiar, and which in our opinion does not receive the attention it deserves. It is needless to say, particularly at this season, that we refer to the dangers arising from fermentative and putrefactive changes due to heat—and uncleanness. Not forgetting tuberculosis, let us bear especially in mind cholera infantum and the other allied complaints which make the parents of every artificially fed baby dread the approach of summer, and impress upon the people, as far as possible, the extreme importance of the greatest care in the management of milk intended for infants.

#### BACTERIOLOGICAL EXAMINATIONS.

At the conjoint-session of the Board with the State Medical Society at Greensboro, in May, 1894, Passed Assistant Surgeon J. J. Kinyoun, who was present by invitation as the representative of the United States Marine Hospital Service, announced that the Service would be glad to give, in its laboratory at Washington, free of charge, a six-weeks' course of instruction in practical sanitary bacteriology, directed particularly to the biological examination of drinking waters, to duly accredited representatives of our Board. Drs. Albert Anderson, of Wilson, and W. T. Pate, of Gibson Station, promptly signified their desire to avail themselves

of the opportunity. They were duly appointed, and in January of the year 1895 went to Washington, where, at their own expense, they spent the full time in practical study and work under the immediate instruction of that eminent bacteriologist, Dr. Kinyoun.

Since their return they have each fitted up a laboratory and are now prepared to make biological examinations of drinking waters, and in suspected cases of tuberculosis and diphtheria. In acknowledgement of the courtesy of the Board in appointing them as its representatives they have agreed to a special arrangement for official work in drinking waters. Owing to our very small appropriation, we are under the necessity of issuing permits for such examinations at the expense of the Board with much circumspection. To insure this, any physician suspecting a water as the cause of disease must first submit the matter to his County Superintendent of Health, or to the *Medical* health officer of his city or town, if it have one, who will write the facts and his opinion as to the necessity for the examination to the Secretary, and if in the latter's judgment the expense would be justified, a permit, with instructions for taking sample, will be sent to the applicant. Examinations made on this permit will be paid for by the Board, but in every instance express charges must be prepaid by sender. County superintendents will please bear in mind the necessity for careful inquiry into all the facts before advising an examination, for the reason above stated. We would be very loth to refuse an application endorsed by a superintendent.

To our readers who are members of the State Medical Society Drs. Anderson and Pate need no introduction, but to those not acquainted with them it is proper to say that they are among the best men in that unusually strong body. Intelligent, earnest, painstaking, scientific, they are worthy of confidence, and we trust that they may receive such support in private work (in regard to which information must be obtained from them direct) as will encourage them to persist in their valuable labors on this line.

In conclusion, we desire to express our appreciation of the enterprise and self-sacrifice shown by the gentlemen alluded to in this matter. It is now well known that the specific pathogenic qualities of infected drinking water cannot be ascertained with certainty by any other method than a bacteriological or biological examination, and it is a great gratification to feel that we have, right here at home, men competent to do this important work, associated with the Board.

PURIFICATION OF SEWAGE-POLLUTED WATERS BY  
SAND FILTRATION.

Those of our readers who do not see the admirable journal of the Massachusetts Association of Boards of Health, will, we feel sure, thank us for giving them the pleasure of reading the following most interesting extract from a paper on the above subject read by Prof. W. T. Sedgwick, at the April quarterly meeting of that body :

" With regard to the purification of sewage-polluted waters I will say only a word or two. The matter may be stated rather briefly, something like this : Why do we attempt to purify sewage-polluted water ? For two reasons : First, because such water is a nuisance ; and, second, because it is apt to be dangerous to the public health. It certainly is dangerous to drink.

" How shall we go to work to purify it ? Well, how does nature go to work ? If the farmer puts upon his field barn-yard manure year after year, giving it a heavy dressing of the material, this is easily taken care of by the mother earth. No one knows or thinks that the farmer is creating a nuisance, the odor is not objected to by anyone. On the contrary every one of us feels a sort of primitive agricultural delight in the smell of good barn-yard manure thus utilized, and we have no objection to living in the neighborhood. I have seen the lawns on Commonwealth avenue in Boston so covered with stable manure that one had almost to hold his nose in passing, and yet the same people who do not object to that odor would complain most bitterly of the slightest odor coming from a garbage pail or anything else of equally unsavory nature or origin. We know that the earth takes care of this organic matter. And the same is true of the conditions of the ordinary untidy country house or the tenement house, where the housewife, to get rid of her dish-water or slops, throws them out of the window. Unless that is done in excess, or for too long a time and under unfavorable circumstances, the earth takes care of all the stuff thus thrown out and little or no trouble ensues. Here is a hint for the doing of the whole thing. The earth is capable of taking care of the organic matter, provided it does not have too much of it or have it for too long a time without change.

" We have arrived at this conclusion by experimentation. As long ago as 1839 London began to filter the highly polluted water of the river Thames through sand filters. It was supposed that by simply straining out the suspended matters and some of the dissolved matters the water would do no harm. Bacteria had not then been heard of. But time has gone on, and it has been found by making a study of the affair that, by putting sewage polluted

water on the land, with the right kind of soil, you can dispose of sewage on land as the farmer disposes of his barnyard manure; or, on the other hand, in the case of sewage-polluted water, that a larger volume of water can be treated, and then recovered through an underdrain and used for drinking.

"An example of the first case, the city of Berlin, a city of a million and six or seven hundred thousand population, disposes of its sewage upon the land. The river Spree runs through the city, but does not receive the sewage except in times of storms, when the overflow goes into the river. The sewage ordinarily is disposed of upon the land: and the same principle is applied as here in Brockton—namely, the putting of a thin layer of sewage upon the soil, and letting the earth take care of it. In the case of Berlin they make use of the sewage impregnated soil to raise crops; but, when you commence to raise crops at the place where the filtering is going on, you must remember that you cease to operate the filter to its highest capacity. In Berlin they raise cabbages and other vegetables, where the sewage of sixteen or seventeen hundred thousand people is disposed of on the land: and the effluent water, as it comes out below, is used for drinking. Here is an instance of the disposition of sewage in this way on a large scale. And if any one says that Brockton's plan is only an experiment, and that no one can say how long it is going to continue satisfactorily, or how it will be in fifteen or twenty years from now, we may reply that Berlin has been doing the same thing for years, and there is no uncertainty about it: that the mother earth, when the place is rightly chosen and the operation is properly managed, will take care of any amount of organic matter which you may wish to put upon it.

"When you come to water purification, there is the same problem with certain modifications. Sewage is water gone bad, water with excess of foul matters—such as we saw to-day—which sewage was not ordinary sewage, but thinner, yet for my purpose answers well enough, because I may point to those filter-beds, and show you sewage-polluted water purified there by sand filtration. It was sewage, so called. It was really sewage-polluted water; and that is what sewage always is. The sewage of Berlin is so polluted that it becomes almost as black as ink, and is thick as thin mud. I have seen it of that character on the filter fields of Berlin, like thin black mud or thick ink. Now in such a case, ordinarily, there is one unfavorable condition: the sewage does not contain any oxygen. These filters are not strainers, they are not mere heaps of sand; but when in good working order, they are rather like living organisms, for they are filled with bacteria which breathe and feed, taking up the organic matters of the sewage.

Oxygen being available, the bacteria resident in the sand feed upon the organic matters, and reduce them to similar matters of a mineral sort, and their organic character is lost. It is as if those filter beds were a gigantic living sponge. You know the sponge before it is gathered is a living mass permeated by narrow channels. And if we imagine one of these filters to be a heap of sand swarming with living bacteria, we can see how easy it is for the sewage-polluted water to flow into this great sponge, and for the living contents of the latter to feed upon the matters it contains. When the filters are water filters, they work more freely, because ordinary water is saturated with oxygen.

"The theory becomes comparatively simple when looking at these filters, if one does not regard them as mere sand, but rather as something which would remind us of London and Paris with their dense populations, great centres teeming with multitudes of individuals. The sewage that arrives they receive with open arms, taking from it the organic matters which are their food, and working them over into mineral matters, which, in solution, pass off below. So the purification of sewage-polluted water is pretty much the same thing as purification of sewage, only the work is done faster because of the oxygen in the water. You have an example of this in the city of Lawrence, where you have heard of the municipal filter designed by Mr. H. F. Mills, of the State Board of Health. That city is now supplied with water fit for drinking, purified by simple sand filtration in a bed two and a half acres in extent. It is not merely a bed of sand, but contains a vast multitude of bacteria, feeding there upon this impure water, which, after it is filtered, goes into a reservoir pure and clear. We may see how the thing works as far as can be seen with the naked eye, but for scientific purposes we must take a microscope, and we shall then find every grain of sand in this great filter coated with bacterial jelly, and bacteria actively at work doing their part in the process. If we wish to see what has been accomplished in this way, we can compare the death-rate in Lawrence as it is now with the death-rate which prevailed before the filter went into operation. Lawrence, instead of standing higher than any other city in the Commonwealth in deaths from typhoid fever, as it did, stands now on a par with those cities which are furnished with a good water supply and having similar industries and climate; and its bad reputation as a breeder of typhoid fever has disappeared. Typhoid fever is no longer "endemic" in Lawrence; it is only occasional and sporadic, as it is in Haverhill, Brockton, Lynn, and all other cities with good water supplies. There are a few cases arising from the use of water taken unfiltered from the river, and a few imported cases, and also cases from using bad

milk and from other sources: but the death rate of Lawrence from typhoid fever now compares favorably with that of other cities of its own size, character and situation having perfect water supplies. In other words, sewage-polluted water that is purified, is not objectionable, but safe. The same thing is true of London, which for many years has been supplied with sewage-polluted water thus purified. The death rate of London from typhoid fever is very low.

"In looking at these so-called intermittent filters, then, one should take out of his mind any idea that they are mere heaps of sand. Every grain of that sand has on it thousands of bacteria which have taken up their residence there in a jelly-like form, so that the total effect is softness of the soil, because of this great aggregate of bacterial life. It is bacterical life which takes care of the farmer's manure spread upon the earth, and of the dish water thrown out of the window by the careless housewife, and of the sewage which is spread on fields, as you have seen it to-day."

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#### COUNTY SUPERINTENDENTS.

The regular biennial meetings of the county boards of health for the election of county superintendents under the Act of 1893 occurred on the first Monday of the present month. Although we took the precaution in our notice of the meetings to call special attention to the fact that according to the decision of the Attorney General a majority of all those eligible to membership was necessary to constitute a legal meeting, and urged upon the physicians the importance of attending and keeping in their own hands the selection of their superintendent instead of letting it go by default to the county commissioners, it happened in several instances that a quorum could not be obtained. We regret this greatly—as we regret anything that shows a lack of interest on the part of our medical men in sanitary matters.

As the result of the elections we have twenty-eight new superintendents. We trust they will all fully meet the grave responsibilities laid upon them. We have been asked for a statement of the duties of a county superintendent. They are laid down so explicitly in the law, a copy of which we will send them together with other publications and blanks, that it would be superfluous to repeat them here. We feel, however, that it would not be amiss to impress upon them the vital importance of promptly carrying out the law in regard to quarantine and disinfection in contagious diseases, especially scarlet fever and diphtheria, under no circumstances permitting the omission of the posting of the placard. We mention this particularly because it has been done, on the ground that it might produce a panic, as if a panic, so far as the

infected house is concerned, is not exactly what we desire to produce. In this connection the fear has come over us at times that in cases in influential families who objected, the attending physician might not always report them to the superintendent as promptly as the law requires (within 24 hours) and that possibly the latter might not in such instances that come to his knowledge be invariably as firm as he ought to be. But the duty of both attending physician and superintendent of health is so plain and so urgent to any conscientious man that we shall dismiss the fear.

The relation between the outgoing superintendents and the secretary has always been so harmonious and agreeable that we see it severed with regret. We would request them to turn over promptly to their successors all blanks and placards they may have on hand together with such suggestions as their experience in the office justifies. And we would thank the new incumbents, after this is done, to notify us of any deficiencies in their outfit that we may immediately make them good.

#### HEALTH CONFERENCE.

On the 6th of next month the State Board of Health proposes to hold a health conference with the people at Washington. The pronounced success of the one at Salisbury in September of last year, as shown not only by the interest evinced by the community in the meetings at the time, but also by the lasting impression made upon it, as we are informed by residents of the town, encourages us to hope for good results in the east. A number of papers are in sight.

We earnestly hope, as it is beyond the power of the Board to hold these meetings in every county, that the attendance will not be limited to citizens of Washington and Beaufort county, but that numbers from the contiguous counties will also participate. The papers will not be technical, but popular in character, and after a subject is introduced by the reading of one, members of the audience will be requested to ask questions and the Board will answer them. We would thank our readers in the section alluded to to spread the above mentioned facts among their neighbors and induce them to attend by leading the way.

Wednesday, November 6th.

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#### AMERICAN PUBLIC HEALTH ASSOCIATION.

Want of space forbids an extended notice of the twenty-third annual meeting of the American Public Health Association at

Denver, October 1—4, but we desire to place on record our appreciation of the cordial reception and abounding hospitality shown us by the citizens of that beautiful and wide-awake city. Dr. Sewell, the chairman of the committee on arrangements, was untiring in his efforts to give pleasure. Among other entertainments arranged for us was a trip to Manitou, Pike's Peak, the Garden of the Gods and Colorado Springs. The weather report at the signal station on top of Pike's Peak, 14,147 feet above sea level, the morning we were there, October 5th, was: snow fall 3 feet, temperature 22°, wind 40 miles an hour. The weather during our stay was, for the most part, beautiful, but one day we had, to quote our famous humorist of Buck Shoals, "Climate enough for a town twice the size." It is an interesting country in some aspects, but we must confess that we came home a hopeless "ten-derfoot."

Owing to the great distance from the centres of population the attendance was not so large as usual, nor were the scientific proceedings, on that account, altogether as interesting. Dr. Liceaga, the leading sanitarian of Mexico, was elected president, after several tie ballots with Dr. Horlbeck, of Charleston, S. C. The next meeting will be in Buffalo, N. Y.

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#### RESPONSIBILITY OF PHYSICIANS IN CONTAGIOUS DISEASES.

While in attendance upon the recent meeting of the American Public Health Association at Denver, we were told by the secretary of one of the State Boards of Health the incident mentioned below. It made a deep impression on us at the time, but since our return certain information which we have occasion to believe is trustworthy, has come to us that leads us to fear that some of our own physicians may be making the same fatal mistake. This fear has deepened the impression referred to and constrains us to place it before our readers. In view of the high character, intelligence and conscientiousness of the profession as a whole, it cannot be that such things happen often, but they are so pregnant with all that is associated with suffering and death—made a thousand times more bitter by the needlessness of it—that a word of warning cannot come amiss. But to the story.

In a certain town, which shall be nameless, there live two families opposite one another on the same street. There are children in each, the mothers are intimate and dear friends, and a day does not pass that the families are not more or less together. Recently a child in one was taken sick. The attending physician



diagnosed the case as scarlet fever, but as it was a very mild case said he did not think it worth while to make an alarm by mentioning it. The children of the family opposite, several in number, visited the little sick friend daily, no one dreaming of danger. They all took scarlet fever and one died. The first time the stricken mother met the physician of the first case she upbraided him with, "Doctor, you killed my child." He attempted to excuse himself, but to the mother-heart, mourning in bitter agony over the needless sacrifice of her child that might have been so easily prevented, there could be no excuse. "Doctor," she repeated, "you killed my child. If you had told my friend that her child had scarlet fever, she would never have permitted my children to enter her house." What an awful accusation! How these words must ring in his ears, and what a pang, if he is not devoid of feeling, the sight or mention of that mother must always bring to his heart!

Now, in this case, the motive of the physician was doubtless in a certain sense a praiseworthy one—the indisposition to say or do anything disagreeable—but that fact cannot erase the dreadful consequence of his failure to do his plain duty. That the attack was a "mild" one, which was urged as an excuse, was of course no excuse at all, for any physician who has learned the a, b, c of medicine knows that the disease can be contracted from a mild as well as from a severe form, and no man can predict what course the secondary case will pursue.

But the duty of the attending physician to sound a note of warning is not restricted to cases in which the diagnosis is plain. Whenever there is any doubt about the diagnosis, as, for instance, in a supposed case of roseola where scarlet fever is known to exist in the community, it is clearly his duty to insist upon the observance of every precaution at least until sufficient time has elapsed for desquamation or its absence to settle the matter. He has no right to take any chances when such serious consequences are involved—to stake the comfort and convenience of his patron against the possible loss of innocent lives. And when the diagnosis is practically certain, it does seem to us that a failure to promptly take steps—every available means—to prevent the spread of the disease would amount to criminal negligence. It may be considered a rather strong expression, but we hold ourself ready to defend the assertion that any physician who knows that he has a case of contagious disease of a kind liable to produce death and who neglects to have carried out to the very best of his ability every sanitary precaution to prevent its spread *gamble*s in human life. How any man can assume the terrible responsibility of a failure to do this simply passes our comprehension.

## TYPHOID FEVER FROM IMPURE DRINKING WATER AT WILMINGTON.

BY GEORGE G. THOMAS, M. D., PRESIDENT N. C. BOARD OF HEALTH.

On the night of the 28th of November last a number of young ladies and gentlemen attended a dance at Germania Hall in Wilmington—an impromptu gathering, which was intended as an entertainment of the members of the foot-ball team which had played a match game in that city in the afternoon preceding the dance. The regular janitor of the hall was absent and a careless and ignorant man was put in his place. A half block below the entrance of hall is a dock in the river into which empties a sewer, draining the closets and waste water of eight or ten blocks. From this dock it appears probable that the water was taken near the point of the wharf, a distance from the mouth of the sewer of about twenty feet, and where the sewerage mixes with the river stream. It is likewise asserted that there was in the cooler into which this river water was poured for use, some water that had been in this receptacle since last April. The janitor on the occasion admits that he brought up some water from the river, but says that it was used to do washing about the hall, and he asserts that the drinking water was obtained from a driven pump in the next block, in the yard of Mr. Haar. Within a week after the dance three young ladies and one gentleman were taken sick. Two more young men sickened within the three weeks following the dance, and we give a brief summary of the cases as best we can below.

1. Miss D., aged 20, was taken sick three days after the dance, and her physician thought she had an attack of influenza. On the fifth day there were marked typhoid symptoms, notably a persistently high temperature. She had a slight diarrhoea and tympany, but there was intense headache, attended at first by hebetude, later by delirium. On the thirteenth day pneumonia developed, and intestinal hemorrhage occurring on the sixteenth day brought on the fatal issue.

2. Miss H., aged 19. Had an entero colitis beginning the day after the dance. This yielded to treatment and in a few days she was up, and attended during the week the following two entertainments. About ten days after the first attack she was seized with fever, of a marked typhoid character, but promising to be mild. The fever declined rapidly and was immediately followed by a gastritis. This, in turn, was checked by rectal feeding and appropriate medication. As soon as the patient was allowed to take food by the mouth, a duodenitis was declared compli-

cated by a swelling of the orifice of the common duct. The gall bladder was quite much enlarged, and pain and nausea, with slight jaundice, accompanied the complications. The subsidence of the duodenitis was comparatively quick, but the fever persisted attended by great prostration. On the twenty-second day a general peritonitis following a period of depression, probably the shock attending a perforation, rapidly closed the life of this young lady.

3. Miss P., aged 18. Had a diarrhoea and probably some fever for the two weeks after the dance, but she was not seen by a physician until the end of that time. Diarrhoea was then slight and followed by constipation. The initial chill of the typhoid fever, was probably on the fourteenth day after the dance. This case was very mild, and atypical. Temperature range was low: there were no nervous symptoms except a severe headache and backache, no tympany, and no delirium. There was a slight diarrhoea after the administration of medicine to relieve the constipation. The patient made a good recovery, the fever leaving her on the twenty-first day from the chill.

4. Mr. P., aged 20, was at home from the University for Thanksgiving day, attended the dance, and went back to the University the next day. He was sick but not confined to his room: too unwell, however, to attend actively to his college duties. He came home for the Christmas holidays and was taken down with a fever that was like the last one reported, mild in type, but which lasted quite three weeks. He made a good recovery.

5. Mr. H's case, age not known, was very much of the same character as case 4.

6. Mr. C., aged 21, was taken sick within a few days after leaving Wilmington. He was dangerously ill for some days, but made a final recovery.

The cases are thus briefly mentioned, because they all were in general affected in the same manner.

There are only two sources from which the water supply might have come—the river at the dock, or the well at Haar's store. But there is no reason to suppose that Haar's well was infected, as it is used by his household and quite a number of small stores in the neighborhood, and there has been no report of sickness from the persons using it.

We submit the report of Dr. Pate, the bacteriologist of Gibson Station, made at the request of Dr. A. H. Harriss, the Superintendent of Health of Wilmington. Four samples were sent Dr. Pate. 1. Water from the dock at half flood. 2. Water from Haar's well. 3. Water from the hydrant of the city water works. 4. Water that had been in the cooler in Germania Hall for ten days.

Although no typhoid fever germs were found by Dr. Pate, it is to be remarked that the dock water contained large quantities of intestinal bacilli, and these may have been the cause of the fever, and probably were, as it is now claimed and generally admitted that the common bacillus of the colon under favorable circumstances may aid in the development of the typhoid germ.

At any rate the action of the careless janitor was followed by a terrible calamity—the sacrifice of two beautiful young women, the darlings of their respective families, and endangered the lives of four other young people.

The report of Dr. Pate is quite complete and he has dealt with the water submitted to him in a most exhaustive manner.

GIBSON STATION, N. C., February 15, 1896.

*Dr. Geo. Gillett Thomas,*

*President State Board of Health, Wilmington, N. C.*

DEAR SIR :—I have the honor to submit the following as a report of the bacteriological examination of the four samples of water collected and sent to me by Dr. A. H. Harriss, Superintendent of Health for Wilmington, N. C., February 3, 1896.

The examination shows that the bacteria in all of the samples are benign forms except those in the river water. No. 1 sample from pump at Haar's store, when first plated in the usual quantities, developed only two colonies of bacteria, and I found it necessary to plate this sample again. This was done after leaving the bottle standing for five days. Then the water was thoroughly mixed by shaking the bottle, and larger quantities plated than usual with the result indicated in the table, viz: 150 bacteria to the cubic centimetre of water. The number of bacteria in this sample is very low for pump water in city soil, and doubtless other samples from the same source would show the general average to be greater.

No. 2 sample from hydrant near Haar's store gives 5,700 bacteria to the cubic centimetre of water which would indicate an abnormal amount of germ food in the city water supply.

No. 3 sample from cooler at Germania Hall gives 9,000 bacteria to the cubic centimetre of water. This water stood in the cooler several days, and it is probable that the increase in the number of bacteria was caused by their multiplication during this time.

No. 4 sample from river contains intestinal bacillus.

Respectfully submitted,

W. T. PATE.

Table Showing Results of Bacteriologic Analyses of Four Samples of Water from Wilmington, N. C.

No	Source	Date	No. of Bacteria to 1 C.C.	Fermentation Test		Wurth's Litmus lactose- agar	Reaction				Litmus Milk	Potato	Inulol	Remarks
				Lactose	Glycerol		Gelatin	Motility	Lactose fermentation	Glycerol fermentation				
1	Tapwater Harr's Store	Feb. 3, 1896	150	Does not ferment	Does not ferment		Pale blue colonies Does not liquefy	Active	Acid	Acid	Not coag- ulated, milk isotropic	White, eleva- ted, moist	None	
2	Hydrant, near Harr's Store	do	5,700	do	do		Brownish colonies Does not liquefy	do	do	do	do	do	do	
3	Cooler at Geor- getown Hall	do	9,000	do	do		Brown spread fungoid masses	do	do	do	do	Yellow ish, moist, spread mass	do	
4	River	do	Immense	Fer- ments	Fer- ments	Red colonies	Yellow ish, spread fungoid masses	do	do	do	Oxygen lateral turbid pink	Yellow ish, dry	Consid- erable	Intestinal bacillus

## NATIONAL CONFERENCE OF STATE BOARDS OF HEALTH.

Together with President Thomas we attended the meeting at Chicago, on the 10th-12th inst., of this, in our opinion, the most useful of all the sanitary organizations of the country. Its membership up to the present time has been limited to the State and Provincial boards of health of the United States and Canada, but at the recent meeting an amendment to the constitution admitting the corresponding bodies of Mexico and the officers of the Marine Hospital Service, which will no doubt be adopted at the next meeting. This, however, will not change the character of the *personnel*, as the new members will be all active, practical health officers.

The programme, embracing papers and practical subjects for discussion, was too long for reprinting here, but we were particularly pleased with a report by Dr. Schwarz, the talented Secretary of the Rhode Island Board of Health, on the certain experiments and observations on the filtration of water. We hope to give our readers the benefit of some extracts from this valuable report when it is published. One of the most important matters brought before us was the report of the committee on the establishment of a national department of health—a subject which has engaged the attention of the American Medical Association and various sanitary bodies for some time. When it was discussed at the conference held in Washington City in December, '94, North Carolina was practically alone in advocating the amplification of the powers and work of the Marine Hospital Service, on the ground that it was already in existence, was well organized and, in our opinion, well managed, composed only of men selected on merit who devoted their lives to sanitary work, and so organized as to be entirely free from the control of politicians. So we were naturally gratified when we heard the report, which was unanimously adopted, recommending this very thing, with proper safeguards, of course, to prevent undue interference with State Boards, including an advisory board composed of one member from each State Board, to meet annually in Washington with the officials of the Service.

On Wednesday night Mr. Lyman E. Cooley, at one time the chief engineer of the work, gave us an extremely interesting account of the great drainage canal of the Sanitary District of Chicago. It is to be over thirty miles in length, emptying into the lower Desplaines river and thence through the Illinois into the Mississippi. Eight miles is through solid rock; the width at the bottom in that part is 160 feet, with nearly perpendicular sides, and the width at the bottom in the earthen portion 202 feet,

with sloping sides. It is designed to carry 600,000 gallons of water per minute, thereby accommodating a population of 3,000,000, and will float any vessel drawing less than twenty-two feet. To give us a concrete idea of the magnitude of the work, he stated that the stone taken out would build four pyramids as large as the great pyramid of Egypt, and the total amount of material removed, if dumped in forty feet of water, would make an island a mile square, showing eight feet above the surface, or would load a freight train 26,000 miles long—more than long enough to encircle the globe. The main body of the canal is finished, nearly \$22,000,000 having been expended up to May 1, '96. It is hoped that the terminals will be completed and the canal in operation in about a year.

The next day we were placed in charge of the genial Dr. Reilly, the Assistant Commissioner of Health, on excursion to view this gigantic work. At Willow Springs, half way down the canal, we were disembarked and served with an elegant lunch, which included a full account of the work from Mr. Eckhart, the President of the Board of Trustees, and a very happy response from Dr. Ruggles of California, the newly-elected President of the Conference, after which we proceeded to view "the big ditch." We were greatly interested in, and impressed by, the wonderful machinery especially designed by American ingenuity for the performance of this particular work.

The following day we were taken to the "cribs"—the intakes of the city water supply—one situated two and the other four miles out in the lake. As our boat passed through the Chicago river, which now receives the sewage of the city, we saw the water apparently boiling in places from the fermentation of the filth, and when we were informed that the water at the four-mile crib had been contaminated several times we could well understand the necessity for the gigantic undertaking of the drainage canal for the sewage, the crowning work of the most enterprising city on earth.

In conclusion we desire to make our acknowledgements to Dr. Scott, the Secretary of the Illinois Board of Health, Dr. Reilly and the other city officials, including the jovial Mr. O'Neill, the veteran alderman. Great is Chicago!

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#### THE PAN-AMERICAN MEDICAL CONGRESS.

The meeting of the second Pan-American Medical Congress will be held in the City of Mexico, November 16th to 19th, inclusive. Dr. Reed, *ex-officio* Secretary of the International Executive Committee, says in a recent letter: "The enthusiasm with which not

only the medical profession, but the Government of Mexico, has taken hold of the proposed meeting, guarantees its success. Judging from the statements of those who attended the meeting of the American Public Health Association in the same city in '92, an extremely interesting and enjoyable trip is assured, to say nothing of the scientific value of the Congress. Any one wishing to attend can obtain detailed information by addressing Dr. Charles A. L. Reed, *ex-officio* Secretary, St. Leger Place, Cincinnati, O.

RICHARD H. LEWIS,

Vice-President for North Carolina.

### TYPHOID FEVER.

The fact that nearly twice as many counties reported typhoid fever this month as did last suggests the advisability of calling attention again to the importance on the part of both physicians and householders of carefully looking after the means of preventing its spread. When it is remembered that 50,000 people die annually in the United States from this disease, of which North Carolina's quota would be about 1,000, to say nothing of constitutions shattered, of the suffering, anxiety, expense and loss of time, the gravity of the subject is apparent and no excuse for repeatedly directing the attention of both the profession and the people to their duty in relation thereto is necessary. Enteric fever is by long odds the most fatal of all the preventable diseases which occur within our borders. And it is undoubtedly preventable, in large measure certainly, and, too, by very simple and inexpensive methods. That the drinking water is the medium of transmission in an immense majority of the cases, and that the water is contaminated by the undisinfected bowel discharges of another case is practically demonstrated. So that the preventive measures necessary may be summed up in an immediate change to a water supply clearly beyond the risk of contamination, or boiling the home supply, and in promptly and thoroughly disinfecting the bowel discharges and the soiled linen. Simple and cheap methods of doing this are clearly set forth in the "Instructions for Quarantine and Disinfection," as well as in the pamphlet entitled "The Importance of Disinfecting the Bowel Discharges in Typhoid Fever," both of which have been widely distributed by the Board. But they have necessarily reached only a very small proportion of the people, and then in most instances when, there being no typhoid or other infectious disease present in the family or immediate neighborhood of the reader, they would probably make comparatively little impression. If, however, the enemy is in sight, or, still more, if he has already attacked one of our own dear ones,



we would read with much care and appreciation, and earnestly put into energetic action, the instructions given for conquering the dread invader. With this idea in mind we have mailed to those superintendents reporting a number of cases of typhoid a package of the pamphlets on that subject, and we earnestly hope that they will see to their prompt distribution among the families having the disease and those near by and liable to become infected. We also beg every one of our readers who knows of a case of typhoid fever in his neighborhood to send us the address of the head of the family that we may mail him direct pertinent sanitary literature, or inform us how many copies he will personally distribute. We are extremely anxious to strike while the iron is hot, that we may make as deep an impression as possible; but we can't strike the iron if we do not know where it is. Won't you do this, and not improbably by writing a few lines on a postal card save one or more lives?

In order to assist in locating the origin of typhoid fever, and checking its further spread when occurring in more or less epidemic form, (the means at the disposal of the Board would not permit it in sporadic cases,) arrangements have been made with Drs. Albert Anderson, of Wilson, and W. T. Pate, of Gibson Station for bacteriological examinations of suspected drinking water. On the back of the permit for this analysis the following appears:

"Parties desiring a bacteriological examination of drinking water must first apply to the Superintendent of Health of his county, (or to the *medical* health officer of his city or town if it have one) who will, if in his opinion there be just cause to suspect said drinking water as the source of disease, write to the Secretary of the State Board of Health, giving his reasons for such suspicion. Should they be satisfactory to the latter he will forward this permit either to said Superintendent, or such other physician as he may designate. The sample must be taken and packed by a *physician*, in strict accordance with the following directions:" Here follow specific directions for taking and shipping samples.

The counties have been assigned as follows:

DR. ANDERSON.

Alamance,  
Beaufort,  
Buncombe,  
Burke,  
Camden,  
Carteret,  
Caswell,  
Chowan,  
Craven,  
Currituck,  
Davidson,  
Davie.

DR. PATE.

Alexander,  
Alleghany,  
Anson,  
Ashe,  
Bertie,  
Bladen,  
Brunswick,  
Cabarrus,  
Caldwell,  
Catawba,  
Chatham,  
Cherokee.

## DR. ANDERSON.

Duplin.  
 Durham.  
 Edgecombe.  
 Gates.  
 Granville.  
 Greene.  
 Guilford.  
 Halifax.  
 Haywood.  
 Hertford.  
 Johnston.  
 Jones.  
 Lenoir.  
 Madison.  
 Martin.  
 Nash.  
 Onslow.  
 Orange.  
 Pamlico.  
 Pasquotank.  
 Pender.  
 Perquimans.  
 Person.  
 Pitt.  
 Rockingham.  
 Rowan.  
 Sampson.  
 Swain.  
 Tyrrell.  
 Wake.  
 Washington.  
 Watauga.  
 Wayne.  
 Wilson.

## DR. PATE.

Clay.  
 Cleveland.  
 Columbus.  
 Cumberland.  
 Dare.  
 Forsyth.  
 Franklin.  
 Gaston.  
 Graham.  
 Harnett.  
 Henderson.  
 Hyde.  
 Iredell.  
 Jackson.  
 Lincoln.  
 McDowell.  
 Macon.  
 Mecklenburg.  
 Mitchell.  
 Montgomery.  
 Moore.  
 New Hanover.  
 Northampton.  
 Polk.  
 Randolph.  
 Richmond.  
 Robeson.  
 Rutherford.  
 Stanly.  
 Stokes.  
 Surry.  
 Transylvania.  
 Union.  
 Vance.  
 Warren.  
 Wilkes.  
 Yadkin.  
 Yancey.

We would suggest to our medical readers to preserve this copy of the BULLETIN so that they can lay their hands on this information when needed.

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 DOES PURE WATER PAY?

The value of pure water cannot be expressed with absolute definiteness in dollars and cents, first, because we cannot say just how many lives and how much sickness it saves; and, second, because if these facts were known their value could not be told in money terms alone. But, while this is true, some figures can readily be presented by the engineer and sanitarian, which may have good effect when water supply or sewerage disposal problems are under discussion.

A good instance of what can be done in this line is presented by

the following extract from a new book on "Water Supply," by Prof. Wm. B. Mason, of Rensselaer Polytechnic Institute, Troy, N. Y. Prof. Mason has made special studies of the relation between water supply and disease, both in this country and abroad. He writes under the caption, "Does Pure Water Pay?" as follows:

"To abandon an existing water supply system, or to purify the polluted water that it furnishes, always involves the outlay of much money, and the city taxpayer has the right to inquire whether or not the benefit derived is a fair equivalent for the cash expended. Impure water affects the yearly death rate, as a whole, much less than that section of it which deals with diseases recognized as 'water-borne,' prominent among which is typhoid fever. No better measure can be selected of the wholesomeness of a city supply than that furnished by a list of the annual cases of this serious disease.

"Typhoid fever is doubtless, to a very large extent, a preventable disease, but the means of prevention, in the shape of great public works, are expensive, and again the question is asked, Do these works pay? Can we afford to save the typhoid victims?

"According to Rochard:

"The economic value of an individual is what he has cost his family, the community or the State for his living, development and education. It is the loan which the individual has made from the social capital in order to reach the age when he can restore it by his labor.

"The statement of this value in the form of money is a difficult matter which has been variously settled by sundry investigators. Chadwick considers an English laborer equivalent to a permanent deposit of about \$980. Farr gives about \$780 as the average value of each human life in England. A French soldier is rated as worth about \$1,200.

"In view of the fact that typhoid fever selects by far the greatest number of its victims from among those in the very prime of life, to the relative exclusion of the very young and the very old, it will be reasonable to follow the figure fixed upon by E. F. Smith and place the loss caused the community by a death from typhoid at \$2,000. This will be noticed to be less than half the figure so frequently referred to in the courts of this State, for the value of a human life.

"for the sake of illustration, let us consider the tax levied annually by typhoid fever upon a city of one hundred thousand inhabitants, for instance, Albany, N. Y. From statistics given in the five last annual reports of the State Board of Health, the deaths due to typhoid fever in Albany average 75 for the year. Rating the money value of each life at the figure given above, this death

rate would mean an annual pecuniary loss to the city of \$150,000. Funeral expenses are variously estimated at from \$20 to \$30. Should we accept the intermediate value of \$25, this item would cause \$1,875 to be added to the above sum, thus raising the total direct loss through death to \$151,875.

" But typhoid fever does not always kill, its mortality rate is commonly quoted at about 10 per cent. For the present purpose, should we assume nine recoveries for each death from the disease, and place 43 days as the period of convalescence, (the average of 500 cases at the Pennsylvania Hospital,) we should have a term of 29,025 days as representing the time lost, per year, by the 675 persons who have the fever and recover. Thus an annual loss of over 79 years has to be borne by the city's capital of productive labor. This great amount of enforced idleness, when translated into money value, should very properly be added to the death loss above estimated.

" Fixing the rate of wages at \$1 per individual per day, a very low figure, considering that the bulk of typhoid patients are in the very prime of life, there is a loss of \$43 for wages for each recovery, or a total yearly loss for the city from this item of \$29,025. The cost of nursing and doctors' bills equal at least \$25 per case, which is a very low estimate, thus adding the further amount of \$16,875 to the gross sum. Expressed in tabular form, this yearly tax imposed by typhoid fever upon the city of Albany is given below, and, upon a most conservative estimate, it is practically \$200,000, which is \$2 a year for each man, woman and child in the city, or a yearly tax of \$10 for every family of 5 persons.

75 deaths at \$2,000 each.....	\$ 150,000
75 funerals at \$25 each.....	1,875
Wages of 675 convalescents, during 43 days, at \$1 per day.	29,025
Nursing and doctors' bills for 675 convalescents, at \$25 each case.....	16,875

Total tax levied annually by typhoid fever upon the city of Albany.....	\$ 197,775
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" It can readily be seen that public works which could eliminate a reasonable fraction of this great tax would pay for themselves in the course of a few years, even though they were originally expensive.

" Finally, it is right to inquire what fraction of the present typhoid loss it would be reasonable to hope to save if pure water should be served in the city in place of its present polluted supply. To answer this question, recourse must be had to statistics obtained from other cities, covering periods before and after better water systems had been introduced. Such data have been already given

for a number of cities and communities, and it only remains to anticipate what will be later said of Munich, and state that improved water and sewerage have reduced the annual typhoid mortality from an average of 25.4 per 100,000 to 2.7.

"Surely pure water pays in a city with such a record, and likewise it would pay in the newer but growing cities on this side of the Atlantic. Americans insist upon being supplied with much more water per capita than is usually furnished for Europe, but they are singularly indifferent as to its quality. It would be a reform of great moment if they could be induced to curtail the present enormous waste of public water, such as that of Buffalo, for instance, which is stated to be 70 per cent. of the entire pumpage, and to spend the money thus permitted to leak away in a vigorous effort to improve the quality of the water. No such lowering of the typhoid death rate as occurred in Munich, San Remo, and sundry other places, could be looked for, perhaps, but a large percentage of the present rate could be cut off, and, we think, from a consideration of the above figures, that such a reduction would pay.

"No weight should be attached to the argument, so often advanced by the individual householder, that he and his family have used the water without evil results for the past fifty years. A single family is too small a collection of units upon which to base any estimate touching the question at issue. Placing the typhoid death rate for Albany, as above, at 75 annually, it would call for one death in a family of five persons every 261 years, a period much beyond the limit of ordinary family record."

#### THE PROPOSED HEALTH CONFERENCE AT CHARLOTTE.

On the 15th of October there will be held at Charlotte the third annual "Health Conference with the People." Our readers are already familiar with the methods observed in these meetings, that they are essentially popular in character, the object in view being to interest and instruct the people in sanitary matters. Papers of a practical character are read and discussed by members of the Board of Health and persons in the audience. In addition the people are urged to ask questions on any subject relating to hygiene, and they are answered by members of the Board or others who are competent.

The meeting at Charlotte promises to be an interesting one, and valuable to that community particularly, but indirectly to the State. Those previously held at Salisbury and Washington have, we have been assured, done much to advance the cause of sanita-

tion in those communities. We trust that the citizens of that progressive city will show in this, the most important of all mundane matters, health, the same interest that they are wont to display in other movements looking to the welfare and upbuilding of their city. But we hope that the attendance will not be limited to residents of the city. Charlotte is such a railroad centre that persons from neighboring counties could easily attend. We believe that they would be repaid for their trouble. It is especially desirable that all Superintendents of Health, as well as other health officers and physicians generally, within reach, should put in an appearance. They are all not only invited but are requested to get as many of their people as possible to attend.

There will be three sessions during the one day, morning, afternoon and night. A number of papers have been promised, and Surgeon J. J. Kinyoun, the distinguished bacteriologist, in charge of the laboratory of the Marine Hospital Service at Washington, will deliver at night an address on "Bacteria," illustrated with the stereopticon. Several days before the meeting the full programme will be published in the Charlotte papers and otherwise distributed.

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#### THE AMERICAN PUBLIC HEALTH ASSOCIATION.

We have just returned from the 24th annual meeting of the above-named association, held at Buffalo, N. Y., 15th to 18th insts. and feel that we would not be treating our readers fairly if we failed to bring to their attention at least one or two matters of great importance and interest that were brought up and discussed. We wish that our space permitted a more extended notice, as the meeting was the most interesting and practically valuable that we have ever attended. Of course much old straw was threshed over, but nevertheless a good crop of solid grain was harvested.

The subjects alluded to above were a new (to us) method of making a diagnosis in typhoid fever and formaldehyd gas as a disinfectant. On the former subject a paper entitled "The Serum Diagnosis Test for Typhoid Fever" was read by Dr. Wyatt Johnston, of Montreal, Bacteriologist to the Provincial Board of Health of Quebec. The test, discovered by Vidal, consisted in mixing the serum of the blood of a suspected case of typhoid fever, which he obtained by bleeding from the arm and used fresh, with a pure culture of typhoid bacilli. If the case were typhoid the bacilli, which normally keep up a constant and rapid motion, would, in from 15 minutes to an hour, become agglutinated to one another and still, whereas, if the disease were not typhoid, their movements would not be interfered with in the least. Dr. Johnston stated

that he had ascertained that it was not at all necessary to draw enough blood to allow separation of the pure serum from the clot, but that a drop of dried blood with which a little water was mixed would answer just as well, having precisely the same effect. He exhibited two specimens which confirmed his statements exactly: and although the bacilli had been mixed with normal blood more than 24 hours, they were still quite active. The beauty of this test is its simplicity, and it can be made by any one having a good microscope, slides for the "hanging drop" mounting, and a pure culture of the bacillus typhosus, which could no doubt be obtained from the commercial laboratories.

The subject Formaldehyd was treated in three papers: "Practical Use of Formic Aldehyde as a Disinfectant," by Prof. F. C. Robinson, Professor of Chemistry in Bowdoin College and Member of the State Board of Health of Maine; "Preliminary Note on the Use of Formaldehyd for Room and Car Disinfection, etc.," by Surgeon J. J. Kinyoun, M. H. S.; and "A Convenient Lamp for Generating Formaldehyd Gas," by E. A. DeSchweinitz, M. D., Ph. D., of the National Bureau of Animal Industry. Nothing could be of more importance or interest to practical sanitarians, for nothing is so much desired by them as a safe and reliable aerial disinfectant, and we could not but feel gratified at the fact that two of the three gentlemen reporting work on this subject—the last two—were natives of our own State. We regret that we cannot go into the subject at length, but must content ourself with stating very briefly some of the results given.

Prof. Robinson said that he had thoroughly disinfected a room 12x20x13 feet in one hour's time by burning one litre (about a quart) of wood alcohol in a lamp of his own construction which he exhibited, killing cultures of bacteria under the bed-clothes, in a mattress (not inside the ticking) rolled around them, and under  $\frac{1}{2}$  inch of sand. Dr. Kinyoun, who has been experimenting with the gas for several months, stated that air saturated with Formaldehyd killed germs in from  $1\frac{1}{2}$  to 2 minutes. Exposure to  $1\frac{1}{4}\%$  of the gas for 24 hours resulted in the death of germs protected by 10 to 12 layers of blanket, and also to those covered by from 36 to 40 layers of cotton sheeting. By using a 10 to 20% solution in Roux's apparatus a room could be disinfected in 20 minutes. He found that none of the car-furnishings were faded, except two pieces of silk. The bacilli most easily killed were those of diphtheria, and the next weakest were the tubercle bacilli. We shall recur to this important subject in a future issue.

In conclusion we wish to express our appreciation of the beauty of the city of Buffalo, not only from the aesthetic point of view, with its handsome buildings, lovely parks and beautifully shaded

asphalt streets, of which it has nearly two hundred miles, but also from the sanitary, for it is decidedly the *cleanest* city we have ever visited. We also desire to acknowledge the kindness and hospitality extended to us through Dr. Wende, the most efficient Commissioner of Health, Dr. Lucien Howe, Dr. Clark and others of the local committee.

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#### DR. JEROME COCHRAN.

It is with much regret that we note the death, since we last went to press, of Dr. Jerome Cochran, for many years State Health Officer of Alabama. Dr. Cochran was a gentleman of acute and cultivated intellect, of high repute in his profession. He was a leading authority in this country on the subject of yellow fever, having had a very extensive experience with that dread disease. He will be greatly missed in the profession at large, but particularly in the field of preventive medicine, to which he devoted the later years of his life.

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#### REPORT OF TREASURER.

FOR TWO YEARS ENDING DECEMBER 31, 1896.

1895.

#### *Expenditures.*

Jan.	12	500 postal cards for notices to Superintendents.	\$	5	00
	22	Stamps.....		10	00
Feb.	1	Salary of Secretary for January.....		83	33
	5	F. P. Venable, per diem and expenses for called meeting at Raleigh January 29.....		15	00
	7	Wax paper for duplicating purposes.....		36	
		George G. Thomas, per diem and expenses for Raleigh meeting.....		18	45
	9	Postage, supplies to Superintendents.....		66	
	14	W. H. Harrell, per diem and expenses for Raleigh meeting.....		22	90
	16	Postage, December and January Bulletins ..		1	31
Mar.	2	Salary of Secretary for February.....		83	33
		1 ream typewriter paper.....		1	00
	9	Express on microscope to Rochester, N. Y.....		1	90
		Postage on Bulletin, February.....		64	
	23	Paid for typewriting and manifolding circular letters.....		1	50
	28	Six-cent stamps for mailing Biennial Report. .		10	00
April	1	Office rent, first quarter.....		15	00
		Salary of Secretary for March.....		83	34
		Two-cent stamps for general postage.....		10	00



	11	Stamps for Health pamphlets.....	\$ 20 00
	15	Express on microscope from Rochester, N. Y..	2 00
	23	Postage for health pamphlets.....	20 00
	24	Postage, Bulletin for March.....	64
		Express on six packages health pamphlets.....	2 51
		Bausch & Lomb for repairs to microscope.....	10 00
April	29	1 copy of Postal Guide.....	2 50
	30	Express, health pamphlets.....	18 94
May	3	Postage, health pamphlets.....	15 00
	4	Express, health pamphlets.....	70
	7	Postage, health pamphlets.....	20 00
		Salary of Secretary for April.....	83 33
	8	Express, health pamphlets.....	2 02
	18	Express, health pamphlets.....	3 05
	23	Postage, health pamphlets.....	20 00
	29	F. P. Venable, per diem and expenses, annual meeting at Goldsboro on 15th instant.....	20 15
		G. G. Thomas, per diem and expenses, annual meeting.....	11 00
June	1	Salary of Secretary for May.....	83 33
		Allowance for clerical help.....	16 67
	4	Express, health pamphlets.....	3 15
	11	Typewriter ribbon, mucilage, twine, etc.....	2 42
	13	Postage, Bulletin for April.....	65
	22	Drayage, health pamphlets.....	15
	24	Postage, health pamphlets.....	20 00
July	1	W. H. Harrell, per diem and expenses, annual meeting.....	27 25
		Express, health pamphlets.....	4 05
		1 copy American Text-Book of Medicine for Secretary's office.....	10 00
	3	Salary of Secretary for June.....	83 34
		Clerical help for June.....	16 66
		Office rent, second quarter.....	15 00
	4	500 postal cards.....	5 00
		Drayage, Bulletin and health pamphlets.....	20
	6	Drayage, Bulletin and Health pamphlets.....	25
		Bacteriological examination of water of cistern at Governor's Mansion and express on sample.....	10 50
	9	Books on hygiene for Secretary's office.....	4 32
	12	Drayage, health pamphlets.....	25
	13	Postage, Bulletin for May.....	63
	30	Postage, health pamphlets.....	20 00
		Drayage, health pamphlets.....	10
		Freight, health pamphlets.....	25

Aug.	1	Express on health pamphlets.....	\$	80
		Telegram.....		25
	4	Salary of Secretary for July.....		83 33
		Clerical help for July.....		16 67
	7	Postage, health pamphlets.....		20 00
Aug.	16	1,500 1-cent stamps for notices of meeting of County Boards of Health.....		15 00
	27	Postage, health pamphlets.....		20 00
	28	Postage, Bulletin, June.....		64
	29	Drayage and freight, health pamphlets.....		1 36
Sept.	3	Large wrappers for packages of health pamph- lets.....		1 75
	3	Postage.....		50
	3	Salary of Secretary for August.....		83 33
	3	Clerical help for August.....		16 67
	3	Dr. Albert Anderson, bacteriological examina- tion of suspected drinking water from Ashe- ville.....		10 00
	4	Express, 14 packages health pamphlets.....		5 62
	4	Postage, health pamphlets.....		50 00
	5	Postage on Bulletin, July and August.....		1 29
	19	Postage, health pamphlets and supplies to Superintendents.....		35 00
	24	Drayage, health pamphlets and supplies to Superintendents.....		25
	26	Postage, health pamphlets.....		20 00
Oct.	2	Express, health pamphlets.....		60
	3	Postage, health pamphlets.....		10 00
	5	Salary of Secretary for September.....		83 34
	5	Clerical help for September.....		16 66
	5	Drayage, 3 loads health pamphlets.....		60
	15	Expenses of Secretary to annual meeting of the American Public Health Association, Denver, Col., 4th inst.....		124 85
	17	Postage, health pamphlets.....		20 00
	21	S. W. Battle, expenses attending American Public Health Association.....		118 00
	24	Postage on Bulletin, September.....		69
	30	J. C. Chase, per diem and expenses inspection of State Normal and Industrial School.....		18 70
	30	Subscription to <i>Engineering Record</i> for Engi- neer of the Board.....		5 00
Nov.	1	Large wrappers for packages of health pamph- lets.....		1 50
	1	Salary of Secretary for October.....		83 33

	1	Clerical help for October.....	\$ 16 67
	1	Office rent, 3d quarter .....	15 00
	12	F. P. Venable, per diem and expenses, Health Conference at Washington, 6th inst .....	27 10
Nov.	16	Express, health pamphlets.....	1 95
	28	J. C. Chase, per diem and expenses, Washing- ton Health Conference.....	28 95
	28	J. C. Chase, 1 day's per diem, work for Normal and Industrial School.....	4 00
	28	1,000 wooden tongue depressors for Public Schools.....	1 00
	30	Miss Daisy Branson, list of lawyers in 34 coun- ties .....	1 50
Dec.	2	Express, 4 packages health pamphlets .....	1 65
	2	Stamps.....	2 00
	2	Salary of Secretary for November.....	83 33
	2	Clerical help for November.....	16 67
	3	Telegrams.....	85
	12	W. H. Harrell, per diem and expenses, Washing- ton Health Conference.....	6 00
	12	R. H. Lewis, expenses, Washington Health Con- ference.....	12 70
	12	Postage on Bulletin, October and November..	1 26
	14	Express on 1,000 wooden tongue depressors.....	65
	19	Postage, health pamphlets and general pur- poses.....	20 00
	21	J. W. Hinsdale, type-written list of all law- yers in the State.....	2 50
	31	Salary of Secretary for December.....	83 34
	31	Clerical help for December.....	16 66
	31	Office rent, 4th quarter.....	15 00
1896			
Jan.	2	Express, supplies to two Superintendents .....	55
	28	Stamps.....	5 00
Feb.	1	Subscription to 8 copies <i>Sanitarian</i> for mem- bers of the Board.....	28 00
	1	Salary of Secretary for January.....	83 33
	1	Clerical help for January.....	16 67
	8	Postage on Bulletin, December and January..	1 44
	8	Drayage .....	10
March	2	Salary of Secretary for February.....	83 33
	2	Clerical help for February.....	16 67
	4	500 postal cards.....	5 00
	6	Postage on Bulletin, February.....	70

	7	Express, 2 packages supplies to Superintendents.....	\$6 60
April	1	Salary of Secretary for March.....	83 34
	1	Clerical help for March.....	16 66
April	1	Office rent, first quarter.....	15 00
	1	Express, health pamphlets.....	80
	14	Postage on Bulletin, March.....	68
	28	500 postal cards.....	5 00
May	1	Drayage, Bulletin.....	10
	2	Express, 7 packages reports members of Board	2 01
	2	Salary of Secretary for April .....	83 33
	2	Clerical help for April.....	16 67
	5	Postage on Bulletin, April .....	69
	9	G. G. Thomas, per diem and expenses, inspection Johnston County jail .....	19 45
	9	R. H. Lewis, expenses on same account .....	2 50
	9	Sundry accumulated small items .....	13 02
	22	G. G. Thomas, per diem and expenses, annual meeting at Winston.....	24 45
	22	F. P. Venable, per diem and expenses, annual meeting at Winston.....	16 85
	22	W. J. Lumsden, per diem and expenses, annual meeting at Winston.....	44 60
	22	R. H. Lewis, expenses, annual meeting at Winston .....	8 05
June	1	Salary of Secretary for May.....	83 33
	1	Clerical help for May.....	16 67
	16	G. G. Thomas, expenses to National Conference of State Boards of Health at Chicago June 10th.....	85 15
	16	Expenses of Secretary to same .....	79 25
	18	Dr W. T. Pate, two bacteriological examinations of suspected water from Wilmington	20 00
July	1	Salary of Secretary for June.....	83 34
	1	Clerical help for June.....	16 66
	1	Office rent, second quarter .....	15 00
	3	1 copy transactions, section State Medicine, American Medical Association .....	1 00
	6	Drayage, health pamphlets .....	25
	6	Stamps .....	10 00
	9	Drayage, 5 loads health pamphlets .....	1 00
	10	Postage on Bulletin, May .....	66
	12	Drayage, health pamphlets .....	25
	16	W. H. Howell, per diem and expenses, annual meeting .....	29 00

Aug.	4	Salary of Secretary for July.....	\$ 83 33
	4	Clerical help for July.....	16 67
	20	Postage on Bulletin, June and July.....	1 32
	20	C. O. Probst, treasurer, dues of the Board to the National Conference of State Boards of Health for two years.....	25 00
	22	1 copy North Carolina Directory.....	5 00
Sept.	1	Salary of Secretary for August.....	83 33
	1	Clerical help for August.....	16 67
	24	Subscription to Engineering Record for the engineer of the Board.....	4 00
	29	Expenses of the Secretary to annual meeting of American Public Health Association at Buffalo, N. Y., 15th-19th.....	65 33
Oct.	1	Office rent, third quarter.....	15 00
	1	Salary of Secretary for September.....	83 34
	1	Clerical help for September.....	16 66
	8	Dr. Albert Anderson, nine bacteriological examinations of municipal water supplies.....	90 00
	8	Express on samples of same from the various towns.....	5 35
	12	Stamps.....	10 00
	13	Express, health pamphlets.....	50
	20	Stenographer at Charlotte Health Conference.....	3 00
	23	Expenses of Secretary, Health Conference at Charlotte and inspection of State Hospital and Deaf and Dumb School at Morganton.....	23 50
	23	Express on stereopticon and apparatus for illustrated lecture on bacteria at Charlotte Health Conference.....	4 55
	23	Postage on Bulletin, August and September.....	1 34
	27	G. G. Thomas, per diem and expenses, Health Conference and inspection State Hospital and Deaf and Dumb School.....	47 35
	27	F. P. Venable, per diem and expenses, Health Conference and inspection State institutions at Raleigh.....	38 38
	28	W. J. Lumsden, expenses as delegate to American Public Health Association meeting at Buffalo.....	43 84
	28	W. J. Lumsden, per diem and expenses, Health Conference.....	51 85
Nov.	2	Salary of Secretary for October.....	83 33
	2	Clerical help for October.....	16 67
	9	Sundry telegrams.....	1 35

	13	Postage on Bulletin, October.....	\$	67
	19	W. P. Beall, per diem and expenses, annual meeting, Health Conference at Charlotte and inspection of State institutions at Greensboro .....		25 00
Dec.	2	Scissors for Secretary's office.....		85
	2	Dr. W. T. Pate, nine bacteriological examination of municipal water supplies, express charges on samples of same and expenses of trip to Fayetteville to obtain proper sample..		100 80
	2	Salary of Secretary for November.....		83 33
	2	Clerical help for November.....		16 67
	14	Postage on Bulletin, November.....		67
	15	Stamps .....		3 00
				<hr/>
				\$ 4,268 04

## RECEIPTS.

Balance on hand January 1, 1895.....	\$	265 46
Appropriation for year 1895 .....		2,000 00
Appropriation for year 1896 .....		2,000 00
Amount advanced by Treasurer.....		2 58
		<hr/>
		\$ 4,268 04

## APPENDIX.

## HEALTH CONFERENCES WITH THE PEOPLE.

The plan of having, at least annually, a meeting with the people to discuss with them the questions appertaining to the public health, inaugurated in September, 1894, at Salisbury—a report of which meeting was given somewhat *in extenso* in the appendix to the last Biennial Report—has been continued. One conference has been held each year, on November 6, 1895, with the people of Washington, in the eastern part of the State, and on October 15, 1896, with the people of Charlotte, in the Piedmont country. These meetings excited considerable interest in the respective communities where they were held, particularly in Washington. They have unquestionably been helpful in educating public opinion in the value and importance of sanitation.

We give below a list of the papers read.

## AT WASHINGTON.

Impurities in Drinking Water—by Prof. F. P. Venable, of the University, member of the Board.

How We Catch Cold and the Best Way to Prevent It—by Dr. S. Westray Battle, U. S. N., of Asheville, member of the Board.

Sanitary Drainage and Disposal of Household Wastes—by Mr. John C. Chase, of Wilmington, Engineer of the Board.

Malarial Diseases in Eastern Carolina—by Dr. Julian M. Baker, of Tarboro.

Preventive Medicine—by Dr. John C. Rodman, of Washington.

Remarks on That Part of Hygiene which concerns the Physician—by David T. Tayloe, M. D., of Washington.

## AT CHARLOTTE.

The Board of Health and the Public, Their Reciprocal Relations—by Dr. Geo. Gillett Thomas, of Wilmington, President of the Board.

The Cause and Prevention of Certain Diseases—by Dr. John Whitehead, of Salisbury, member of the Board.

Drinking Water and Typhoid Fever—by Prof. F. P. Venable, Ph. D., of the University, member of the Board.

Purification of Public Water Supplies—by Mr. John C. Chase, of Wilmington, Engineer of the Board.

Effects of Alcohol on the Human System—by Dr. S. Westray Battle, U. S. N., of Asheville, member of the Board.

The Insane Population of North Carolina—Can the State Care for Them?—by Dr. P. L. Murphy, Superintendent of the State Hospital at Morganton.

Bacteria: Illustrated with the Stereopticon—by Passed Assistant Surgeon J. J. Kinyoun, U. S. Marine Hospital Service, Washington.

Infectiousness of Milk—by Dr. Richard H. Lewis, of Raleigh, Secretary of the Board.

General discussion, the audience often taking part, of the subjects brought forward by the papers, and of other subjects suggested by questions by individuals in the audience, completed the proceedings.

Some of the papers of a specific as contra-distinguished from those of a more general character, follow:

## SANITARY DRAINAGE AND THE DISPOSAL OF HOUSEHOLD WASTES.

BY J. C. CHASE, OF WILMINGTON, ENGINEER OF THE BOARD.

(Read at Washington Health Conference.)

The necessity of thoroughly draining town-sites can hardly be over-estimated. It is so generally admitted that any argument to that effect would seem to be superfluous. Unfortunately, however, the masses do not need argument so much, as having their attention aroused to the danger of their unhealthful surroundings and unsanitary mode of living.

"Familiarity breeds contempt" and the average citizen will apathetically continue to endure his present ills instead of exerting himself to secure an improved condition of affairs. The dangers to health and life conditioned upon dwelling in the low, swampy sections of our State are so well known that they need not be dwelt upon. The advantage to public health gained by draining these swamps and putting them under cultivation is also a well-established fact, and a noteworthy illustration may be found at the convict camp at Caledonia.



The rapid and thorough removal of surface water should be the first great care in the carrying out of city sanitation. All lots should be so graded that falling water will run off with the greatest facility, and under no circumstances should pools of stagnant water be allowed to remain under dwellings. Pure water, under such conditions, would be bad enough, but when we consider that these pools are more than likely to be a decoction of the filth that too often accumulates about the average household, the prospect is far from inviting. I hope that such conditions are not common in the city we now have the pleasure of visiting.

Stagnant surface water is not alone the cause of the many ills that may be traced to an excess of moisture in our surroundings. The close proximity of the ground water to the surface is nearly, if not fully, as detrimental to health, and its removal from the vicinity of habitations should be the first care, when the establishment of a home is under consideration.

Unfortunately, in the building of cities, due regard is not paid to the question of drainage. As is well known, cities are a growth, which, too often, takes no thought for the future, considering, if any consideration is given to the matter, that the future can take care of itself. It is hardly possible to conceive of a more foolish idea.

The result is that, eventually, we find that our city contains numerous basins of entrapped water, that could have been easily disposed of, if a wise forethought had been exercised in the matter of surface grading, before the lots had been covered with habitations.

The first care then in beginning the sanitary improvement of that type of city, which we may style an overgrown village, will be to perfect its surface drainage. The streets should be so constructed that the water will flow quickly into gutters that will carry it beyond the confines of the city. These gutters should have such a slope and be kept in such a cleanly condition that the water will not have a chance to remain in pools to stagnate and putrefy.

In a city having the light grades that are the rule in those in this section of the State, the desired results can only be secured by vigilance exercised to, perhaps, a greater degree than we can hope for in the present state of popular opinion.

It goes without saying that all house lots should be raised to a grade that will permit of their surface drainage passing into the street gutter, if possible, or, failing in that, some system of underground drainage should be provided that will discharge at an elevation that will produce the desired effect.

This much for surface drainage. Now we can go a step farther and say that in the interest of healthy homes we should permanently lower the ground water near habitations to at least five or six feet below the surface. A soil thoroughly saturated with water is little, if any, more satisfactory as a local condition than dwelling over an actual water surface.

In a porous, gravelly or sandy soil this danger is reduced to a minimum, but in the compact clayey soils of certain sections a thorough system of underground drainage is the only sure way of remedying the difficulty.

It is too much to expect that this city, for instance, will embark in such a scheme, and the only chance of improving the local conditions would seem to be by paying due regard to securing effectual surface drainage, so that in due time the ground water level would be lowered, to some extent, by seepage into the lower strata. The slight elevation of the general surface of the city above the water level of the river does not afford much encouragement for any material lowering of the ground water level.

Frequently in the location of cities no regard is paid to the proximity of creeks or swamps that in due time are found to be unpleasant neighbors, to say the least, if not actually detrimental to health.

If the city does not find it practicable to move, the question of abating the nuisance becomes a live one. If, as is often the case, the swampy territory cannot be thoroughly drained and turned into habitable territory, a deep channel can be dredged which will give a clear and unobstructed waterway and aid very materially in reducing the quantity of stagnant water. The material removed can be used to raise the grade of the adjacent territory, the banks of the ditch or canal being protected by bulkheads, if necessary.

The disposal of household wastes is a serious question for the average householder, for on the satisfactory solution of this problem depends much of his comfort, convenience and happiness. For a certain class of the wastes, more particularly the liquid ones, water carriage by means of a sewerage system is by far the best method, assuming that the system is properly and thoroughly constructed, and that the disposal of the effluent is accomplished in a satisfactory manner. There is a large amount of refuse, however, that it is impossible to remove by the means of sewers; we also have aggregations of houses that do not enjoy the advantage of sewer connections, and it is a serious question to devise for such cases satisfactory methods of disposal.

This paper is intended primarily for the benefit of those residing in our smaller cities and towns, who do not enjoy the advantages of a sewerage system, or the regular and systematic collection of garbage.

The first device resorted to is what is known as a "cess-pool" or "dry-well," into which the wastes from the kitchen sink, bath tubs and water closets are discharged, and out of which the liquid components are supposed to leach into the surrounding earth. If the earth is reasonably porous and the use of water is not excessive such receptacles will serve the desired purpose for a term of years, but sooner or later the pores of the earth will become clogged with filth and the receptacle will fill up and require that its contents be removed from time to time.

This method of disposal is generally regarded by sanitarians as highly objectionable and to be tolerated only when absolutely no other way is practicable. The danger to the health of a household by the putrefying gases from such a collection of filth finding access to the dwelling by means of defective plumbing can scarcely be overestimated. In its best estate this device should only be tolerated, and in its worst prohibited as verging on a danger that is little short of criminal. Cess pools should be absolutely forbidden in towns and villages obtaining their water supply from wells.

Country houses and those situated on large lots in villages can very often dispose of their sewage by permitting it to run out on the surface of a grassy or cultivated slope, care being taken that the quantity discharged in one spot is not large enough to create a stagnant pool.

If a ditch from the end of the outlet is so constructed as to uniformly distribute the daily flow over a fair sized area, the sunlight, air and vegetation will keep the locality practically innocuous.

In this climate I know of no better way to dispose of the liquid wastes of a household, where a sewerage system is not available, than by throwing them out on the soil, at a proper distance (not less than 100 feet from any well or spring and on a lower level) from the dwelling. Care should be taken not to concentrate the quantity in any one spot, and if thrown upon grass ground, which is preferable, any heated water should be allowed to stand until it is cooled. If not thrown upon grass ground the soil should be stirred up from time to time to prevent its becoming hardened with an impervious coating of filth which would detract very seriously from its absorbing power.

This method is virtually the intermittent system of filtration which has given such excellent results in the purification of water and sewage. The area required for handling the wastes of an ordinary household is insignificant.

For ordinary kitchen refuse, generally known as "garbage," the most satisfactory method of disposal is by burning or burial, except where a systematic and regular collection of it is made by the

municipal authorities; and even then the average householder can very often take care of his own wastes more efficiently than by leaving the work to be done by the average city department with the usual inefficiency and delays. In the interest of cleanliness, decency and health, accumulations of this sort should not be allowed to exist.

The most effectual way of disposal is by burning, and the kitchen stove can be used to good advantage for that purpose. The principal difficulty will be the large amount of moisture that will naturally be found in such stuff, which will deaden, if not put out, the fire should an attempt be made to burn it in its ordinary condition. Several devices have been put on the market designed for the purpose of drying the refuse before any attempt is made to consume it. The most successful is one designed by Dr. S. H. Durgin, Chairman of the Boston Board of Health. It is merely a metal basket that is inserted into the stove-pipe. After the charge has been sufficiently dried it is emptied into the fire, where it is readily consumed.

While cremation is without doubt the *best* method of destruction for all kitchen refuse, it is perhaps too much to expect its general use by the majority of householders. It will, however, be of great service in buildings occupied by several families, which have limited or no yard privileges.

In our small cities and villages, where isolated houses are the rule, and the lots are sufficiently large, this refuse can be incorporated into a compost heap without any unpleasant or unhealthful results, or buried outright. If burial is resorted to, a shallow trench can be dug, and as each day's deposit is made, the adjacent earth thrown over it, thus making the excavation for future deposits.

The care of the ordinary privy and disposal of its contents at the occasion arises is one of the most troublesome questions in household sanitation. Although sanctioned by custom from time immemorial, I regard the common tight brick vault as an unmitigated nuisance. The ordinary practice of retaining a mass of semi-fluid filth for several years, as is often the case, in close proximity to dwellings, cannot be too strongly condemned. It is perhaps too much to expect that we can bring about the use of the "pail system," where a lined bucket would be used as a receptacle for the excreta, the contents being removed each day, and buried, the bucket being recoated with lime before replacing it.

For the class of homes we have under consideration, I can conceive of no better way than to have the privy entirely above ground, without any receptacle for the excreta, other than a slight

depression in the earth. The excreta should be at once covered with a suitable quantity of dry earth or ashes, which would absorb any liquids and render the whole mass virtually innocuous. A receptacle for the covering material should be kept in the privy, and replenished as often as it may become necessary. The accumulation should be removed weekly and buried, or used for fertilizing purposes.

This method would naturally prevent using the privy as a receptacle for the ordinary liquid wastes of the household, as is frequently the case, but these can be easily disposed of by a general distribution on the soil, as has been previously outlined.

Where the municipality takes upon itself the removal of the garbage and night-soil, the householder may experience a certain amount of relief from the onerous duty of personally attending to these duties, but I venture the assertion that he will probably secure better results by continuing to be his own scavenger. In any event he will realize that it is only by perpetual vigilance that a semblance of cleanliness can be maintained in this respect.

I have thus endeavored, in a brief and informal manner, to present a few ideas on the various branches of the topics under consideration, which, it is hoped, will tend to create a stronger public sentiment in favor of more healthful environments for the great mass of our citizens.

These views are not dogmatically presented as the only way of accomplishing the desired results, but rather as indicating some of the methods that can be used to aid in making our homes cleanly and comfortable, fully believing that where cleanliness, comfort and convenience abound good health is not far distant.

It is not considered out of place in conclusion to bear testimony to the important power that can be wielded by the mistress of the household in the line of securing proper sanitation. We hear a great deal in these days of the "New Woman," whatever the term may mean. If she comes educated and trained to uphold the hands of the physician and sanitarian, her coming, whether on bicycle or in bloomers, will be heartily welcomed, and she will receive the honor and praise that, it is hoped, will eventually come to all those who devote their lives to ameliorating the condition of a large portion of the human race.

## IMPURITIES IN DRINKING WATER.

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BY F. P. VENABLE, PH. D., PROFESSOR OF CHEMISTRY IN THE  
STATE UNIVERSITY.

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(Read at Washington Health Conference.)

The purity of the water supply is a question arousing a very anxious interest at present in the various communities of this and other States. And it is fully time that all were waking up to the extreme importance of the question. Next to the air we breathe, the freedom of the water we drink from all that endangers health should give us most concern.

It is right and proper that we should object to having our sugar mixed with barite, parched beans sold us for coffee, and sulphuric acid for vinegar. Such adulterations as these are often dangerous and justly arouse our indignation because of the fraud and wrong connected with them. But none of them approach in insidious threat against health the pollution of that every-day necessity, our drinking water.

It being granted, then, that pure water is a necessity, the anxious citizen is inquiring how he shall decide as to this purity, by what tests he may detect pollution, and it is my object to day to clear away, if possible, the technical mists, and make this matter of water analysis a little clearer to the average water consumer.

I propose to divide the subject up as follows:

1. The Sources of Supply.
2. The Cause of Contamination or Pollution.
3. The Nature of the Impurities Most Commonly Met With.
4. The Tests or Methods of Analysis.

#### THE SOURCES OF SUPPLY.

According to location, our drinking water is drawn from springs, streams, wells, or stored up rainfall water.

In the case of springs, we have usually a very excellent but a very inadequate source of supply. It does not often happen that the spring gushing out at the foot of some hill yields a supply more than sufficient for one or two neighboring farm houses. For our purposes, then, it need scarcely be mentioned except as a possible source. It should be stated, however, that though often very pure all spring water is not above suspicion. Water coming from a hill, the sides of which are polluted, must almost of necessity be polluted itself. I have in mind now a large spring, which formed part of the supply of a certain town outside this State. On the hillside was the very populous cemetery. It goes without saying that the water of that spring was quite unfit for drinking.

and caused much sickness wherever used. Often in the country we find the farm house and all the out-buildings placed upon the hillside, and drained right into the spring which furnishes the water of the place.

In many towns in this State the most available source of supply is some country stream. These are unfortunately generally small. I say unfortunately, because the smaller streams have less chance for self-purification than the larger ones, as the dilution is less. They are subject to a great many sources of pollution, and can only be considered safe when the community owns and carefully guards the entire water-shed. One case of typhoid fever in a farm house bordering the stream, or built upon an overhanging hill and so draining into it, could easily communicate the disease to hundreds of people.

The stables and outhouses of these farms are frequently placed upon the banks of a smaller branch, which thus has the filth of man and beast thrown into it, carries it down to the large stream and contaminates the whole.

But the chief supply of most of our towns, villages and scattered houses is in the wells, and therein lies the great danger. Not that well water may not be pure, but in most crowded communities it stands very little chance of retaining whatever may have been its original purity. Each well acts as a drain for the immediately surrounding neighborhood. The amount of surface drained depends, of course, upon the nature of the soil. It is surprising how great an extent of surface is drained by a deep well in a loose porous soil. Some experiments carried out at Memphis and elsewhere show that a deep well can be contaminated by filth more than a quarter of a mile distant. Often the filth of many years has accumulated upon and for a foot or more down in this soil, and the seepage of the rain and other water must of necessity carry it on down into the well. Knowing the impossibility of cleaning this surface, or of keeping it clean as the population increases, sanitarians, as a rule, look with disfavor upon wells as a reliance for the drinking waters of thickly settled communities. There is no method known of purifying such a soil, and no safety in the use of the wells after it has once become infiltrated with decomposing organic matter. It is an error to think that the mere cleaning out of a well contaminated in this way can materially aid in its purification. Cleaning out removes the body of polluted water already standing in it, only to make room for the inflow of that freshly polluted. Many have the idea that the abundant use of the water, lowering the level, bringing in fresh, preventing stagnation and splashing down a supply of fresh air

are all aids to the purification, but it is manifest that these are methods quite inadequate to deal with the water filtering down through the mass of garbage, offal and poisoned earth.

This question of the use of wells is one that sanitarians have to deal with everywhere. Even in large towns with abundant supply of pure water, it is found impossible to make all discard the use of the wells their fathers dug. I know of a town in Virginia where clear, pure mountain water is supplied by the municipal authorities. Still many use the old wells. In the first three years after the introduction of this water supply there were sixty-three cases of typhoid fever, sixty of which were among those who used the well water. I might strengthen the ground I take with regard to the average well by giving you the analyses of water drawn from the famous well of Mecea and from certain old wells of Spain. Suffice it to say that these were found to be literally liquid sewage. And the commission sent to examine into the condition of Havana, with a view to combating the yellow fever scourge in its home, found the soil of that fever-ridden city for several inches down simply a mass of festering filth. Now I will admit that some of this filth can be kept out by sinking a narrow, deep well and thoroughly lining it with iron tubing. Such a mode of procedure forces the water to go through a greater depth of soil before it can enter the well, or draws its supply from the deep subterranean waters, cutting off that which we call the surface water. This method can often be of great use, as has been shown in the eastern section of our State. But that it would be a safe remedy everywhere is disproven by the experience in New York city. Some very deep wells have been sunk there, really corresponding to artesian wells. They have pierced through the upper strata of loose soil, rock and clays to a depth of several hundred feet, and found there pockets or reservoirs filled with the city's sewerage, which has soaked through to that and perhaps even greater depths. There is little or no chance for self-purification on the part of the water which has thus sunk below the level at which it can obtain fresh supplies of oxygen.

As to the last source of supply—the use of cisterns, tanks, and other storage reservoirs for rain water—I may say that the chance for pollution is three-fold. First, the impurities washed out of the air. This in crowded cities and in times of epidemics may be a dangerous source of pollution. Secondly, many impurities are washed down from the roofs on which the water is collected. Third, it has been found that the various cements used are not impervious to water, and that polluted water leaking from some near sewer can pass through the walls of an underground cistern, and so contaminate the whole.



We have now gone over the different sources from which we draw our drinking water, and have seen how easily it can become polluted, in fact, how difficult it is to prevent this pollution, and how carefully we must watch and guard against it. It will be well next to look into the nature of these impurities and to form some idea as to their relative danger.

It is well for me to remark, first, that perfectly pure water is never seen, and is not desirable. If I were to prepare for you a goblet of chemically pure water, and I can assure you that it would cost me much time and labor to do this, you would probably content yourselves with the merest sip, and reject the rest as being insipid or distasteful. The natural pure water of which we have been speaking contains certain impurities found in all waters, and hence we call these impurities normal impurities. These include certain gases gotten out of the atmosphere or soil, as oxygen, nitrogen and carbonic acid, and a few others in smaller amounts; then from the soil a number of mineral substances are taken up. These are usually in small amounts, and are the very same ones which are utilized in the animal organism. If these are present in excessive or abnormal amounts they act medicinally, and the water is called a mineral water. Of course these mineral waters often contain abnormal constituents, such as alum, lithia, etc., not ordinarily present in drinking water. Perfectly pure water is insipid to us because we have become accustomed to the taste of these minerals and gases, and notice immediately the lack of flavor caused by their absence.

The more dangerous impurities are those of vegetable or animal origin, and these again may be dead and undergoing the changes caused by decay or fermentation, or they may be living. The decaying organic substances are usually present in quantities too small, even in very impure waters, to be directly dangerous themselves. The danger from them lies rather in the fact that they afford, during their decay, an excellent feeding ground or nutritious medium for the growth and multiplication of the living vegetable matter, or, as we have grown accustomed to call them, the bacteria. The portion of the vegetable or animal matter which is especially necessary for the growth of these bacteria is that containing nitrogen, as the bacteria are themselves nitrogenous. This nitrogenous matter, during the decay, changes into either ammonia or nitric acid. The portion of the plant or animal which mainly yields this nitrogen is that which we call albuminoid, and is similar in nature to the white of eggs or the lean muscular part of the meat. Now, let it be distinctly understood that it is not maintained that the greatly diluted solution of these

substances which we would get in an ordinarily impure well water is, of itself, a source of disease. It would greatly disgust us to know that we were drinking such stuff, but we might unconsciously partake of it and never know it. Some may recall the experiment of the famous, or infamous, German doctor who gave a number of his patients diluted sewage to drink for as much as thirty days, not letting them know the nature of the loathsome draught they were taking. He did not notice any bad effects from the experiment, and so concluded that sewage was a safe article of diet at all times. The same experiment is being constantly tried in our cities and towns. I do not doubt that many a person is enjoying his daily dose of diluted sewage from the old well in his back yard, and because it has not yet made him sick, or he has been able to lay the blame of any sickness upon some other cause, he concludes, as Dr. Emmerich did, that the well is all right and its water entirely above suspicion.

Living organisms are present in all waters. Even if originally lacking, they would be acquired very quickly on exposure to the air. These organisms are of many different kinds, but we can divide them into two divisions, the harmless and the disease causing, pathogenic as they are called. These latter form the most dangerous impurity of water, if we can so call them. Some of these organisms or bacteria, as we shall call them, wage a busy warfare upon the others, and succeed in destroying many of them. This doubtless brings to an end many pathogenic bacteria, preventing their multiplication, but it will not do to trust to such means as our only safeguard. These bacteria are found in the air and in the soil. The germs seem to be almost everywhere waiting for some suitable medium upon which to settle and multiply. Bacteriologists claim to have found them even in the pure air of the higher Alps, and in hailstones coming from very elevated regions of our atmosphere. They are easily destroyed by sunlight and by dry air. They are generally found only in the first three feet in depth of the soil, reaching their maximum as to numbers at from six to eighteen inches. The walls of a well form a continuation of this life range, so that one can find these at a considerable depth.

A full study of the impurities of water requires the services of an experienced chemist and a bacteriologist. I say advisedly an experienced chemist, because I wish you to understand that I attach almost no importance to the various easy tests recommended by some for the use of any one who wishes to find out for himself whether the water is impure or not. In the first place, because qualitative tests alone are in this case of very little value,

and further, because no good, all-round test has ever been discovered. The permanganate test, the silver chloride, and others are often quite misleading, especially in untrained hands.

The chemist has to determine the total amount of solid matter, but he need not determine the nature of this mineral matter. It is only important to know that it does not exceed certain limits. Then he generally contents himself with obtaining a knowledge of the amount of chlorine, the amount of ammonia, of what he calls albuminoid ammonia, of nitric acid in the combined form as nitrites, and of the total organic matter, and of nitrous acid as nitrates. He does not concern himself with the other impurities which may be present at all. The reasons for this mode of procedure are simple. In the first place, it is hopeless in our present stage of knowledge to attempt to determine all the different kinds of organic matter in the very minute amounts in which they may be present. Secondly, this knowledge, if we could get it, is not absolutely necessary. The chemist wishes to find whether those forms of matter which best nourish the disease-germs are present. Animal organic matter is then most to be dreaded, and of this mainly the nitrogenous portion. If animal matter can be detected, and thus the impurities traced to an animal origin, there may be a strong suspicion that disease germs are also to be found. As to the vegetable organic matter, he contents himself with burning it or using some oxydizing agent upon it merely to determine whether it is in excessive amount or not.

Considering then, first, the chlorine, the chemist regards this as pointing to common salt, which is one of the most easily detected components of animal sewage. Of course some common salt will be found in any water which has percolated through any depth of earth. Sometimes, as near the ocean or large deposits of salt, the chlorine found in the water will be quite large in amount. The chemist must know something of the average amount of chlorine to be found in the water of the section from which the sample came in order that he may be able to decide whether the chlorine exceeds the normal amount or not. You will notice what a devious path he is forced to tread. First, he supposes that the chlorine found came from common salt, then he must fix upon a certain amount of this as normal to that particular water; then he takes for granted that all chlorine in excess of that came from the salt of animal secretions. Where he is occupied with the repeated analysis of the same water throughout a long series of experiments, he is justified in these assumptions, but where it concerns one single analysis of an unknown water, he is guessing very much in the dark. The fact is, the chemical analysis of water is most

useful when the same water is analysed week after week or month after month, and the changes in it carefully noted. This is done for the water supply of London, New York and many large cities, and should be done for all.

As to ammonia, the chemist distinguishes between two different kinds of ammonia; first, the free ammonia; this may come in part from the atmosphere, but very little is usually gotten from this source; the rest of it comes from the decaying organic matter which originally contained nitrogen. The second kind of ammonia he calls albuminoid ammonia. Many chemists object to this name, but most of the analysts so report it in their analyses of waters submitted to them. It means the ammonia which is gotten by the action of strong chemicals upon the undecayed organic matter present in the water. It does not exist as such in the water, but is formed by the treatment during the analysis. This, of course, points more directly to the presence of animal matter than the other ammonia, and the chemist regards the healthfulness of the water as open to grave suspicion if much of it be found.

Some of the organic matter containing nitrogen in decaying changes into nitric acid rather than ammonia. The first stage of this oxidation is nitrous acid, which, of course, would only be found in the state of combination as nitrites. The nitric acid in the same way would be nitrates. These may be gotten from the air, but only in very small amounts.

We have seen, then, that the chemist looks for a few things in the water, not because they are within themselves dangerous, but because he believes that they point to dangerous constituents. And he chooses these, furthermore, because he has for these some of the most delicate tests in his entire repertoire and it is incumbent upon him to detect them when they are present only in a few parts in the million of water, or even in the ten million. You must not blame him for this. So subtle are the dangers which may lurk in a polluted water that they are almost beyond our clumsy grasp. The chemist is reduced to guess work. He is on the outlook for danger signals. If he is put in control of a water supply, and watches it as an engineer does his train, he can detect the red flag in time but he can speak with certainty only of a very impure water indeed when is allowed only one glance at it.

I will mention that the chemist often reports other things as determined besides those mentioned, but they are of minor importance, and the practice concerning them is not uniform.

When the chemist is at fault, who will help us decide whether the water is impure or not? Bacteriologists have shown themselves very helpful in ferreting out those living organisms men-

tioned as the most dangerous of all the impurities. They can roughly count the number of the bacteria, and they can give some idea as to their nature, whether dangerous or not, but they cannot yet tell us all that we would like to know about these pest-breeding germs.

The combined work of chemist and bacteriologist is incomplete and unsatisfactory without the aid of the sanitary engineer who can examine the surroundings of the well, the watershed of the stream, &c.

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## HOW WE CATCH COLD AND THE BEST MEANS OF PREVENTING IT.

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BY DR. S. WESTRAY BATTLE, OF ASHEVILLE, N. C.

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(Read at Washington Health Conference.)

What we commonly know as a cold is scientifically and properly a catarrh, from the Greek word Katarreo, I flow down; and a cold in the head is scientifically a coryza; but by whatever name it may be called, its main feature is acute inflammation beginning in the upper respiratory tract, and commonly begins with a feeling of chilliness, hence the common name of cold, which may be or may not be attributable to external causes. Sometimes the sense of chilliness is absent, there being only a sense of languor and indisposition. Not infrequently there is no sensation of any unusual kind until a feeling of stuffiness is experienced in the nostrils, or severe headache, and hoarseness, or cough, or oppression of the breathing. This affection is also frequently ushered in by sneezing. The usual course of colds attacks the nostrils first, and afterwards the air passages leading to the chest, when it commonly takes the name of bronchial catarrh or bronchitis. If it habitually attacks the chest without running through its ordinary course, as above indicated, there is often some special cause of delicacy or weakness about the lungs, and such persons should see to it that this tendency is eradicated by observing some of the measures to which I shall call your attention, else a chronic inflammation of the lungs, or consumption, results, the direct malady which we have to contend with at the present day—the scourge of modern civilization.

Colds are most common in temperate latitudes, especially in changeable, moist climates and the winter months. Per-

haps this fact in a great measure accounts for the prevalence of tuberculosis or consumption in temperate, moist climates, which prevalence also may be accounted for by the now well established communicability of consumption through the medium of the bacillus tuberculosis, the name by which we know the germ of this disease, and about which I endeavored to make you acquainted some months ago in Salisbury, to the end that we might lessen the frequency of this disease by exercising the proper precautions in our daily life and association with one another. So then we have noted the fact that this affection, common cold, usually begins in the nostrils. The discharge is usually at first watery, becoming afterwards more abundant and glairy, and frequently of a yellow color. There is usually more or less irritation of the surfaces affected, and probably no one of the little miseries of life is more prostrating and discouraging than a bad cold in the head.

Experiments intending to prove the contagiousness of common cold have resulted negatively, though we do have epidemic influenza, the results of which, in the form of tuberculosis, nervous prostration and almost numberless complications are very much in evidence to-day, though we are now enjoying a lull in this distressing and dangerous affection. There is no danger of mistaking the diagnosis of this affection, and it can only be doubtful when the attack is the forerunner of some acute specific disease as measles or the early stages of hay fever. Mentioning hay fever reminds me that perhaps it may not convey to your mind just what I mean, and I don't know that anybody ever conveyed to my mind, satisfactorily, just what hay fever is, but it is a sort of autumnal catarrh very like an ordinary cold. It is supposed to be caused by pollen from some of our fall wild flowering plants, more especially the rag-weed, but goldenrod and a number of other plants come in for their share of responsibility. Even the rose, which by any other name would smell as sweet, is a rank poison to some of these hay fever sufferers; so common in fact in some parts of the country, to give the name of rose cold to the trouble.

Ladies and gentlemen, don't neglect your colds, your own or your children's. Simply because colds get well, or have the tendency to do so in the healthy, does not relieve us of the responsibility of preventing such attacks or doing everything in our power to shorten and prevent the complications which sooner or later will manifest themselves if we take not warning.

Let us briefly take up the homely methods of treating a cold before we discuss preventive measures, though I may be justly

accused of putting the cart before the horse; yet to fully appreciate the essence of the thing we must first have it, then forewarned we should gird up our loins and be forearmed ever afterwards. So we may divide treatment of colds into absorbtive and preventive measures.

The ordinary duration of a cold being more or less indefinite, our main effort should be to render the attack as short as possible, bring about a reaction and equalize the circulation which has been upset by this peculiar process which has affected the delicate system of nerves presiding over the caliber of the blood vessels. Confinement to the house, and usually to the bed, is usually the first step for a day or two, and nothing is better in the very beginning than a warm bath, even a hot foot bath will usually suffice to remove the chill, and then a laxative and light diet will, more often than not, break the cold attack in forty-eight hours. The ancient maxim to starve a fever and feed a cold, in these days of progressive medicine does not carry with it the same force that it did in days of yore. If the exposure has been unusual, and the attack ushered in with great discomfort, I know nothing better than a cup of hot water, to which has been added a teaspoonful of paregoric (for a grown person,) to be repeated in a couple of hours; or hot whiskey or brandy, should the paregoric be objectionable, under ordinary circumstances would be followed by marked relief. In case of children the most speedy relief is the family physician, and just here I will emphasize the fact that a stitch in time should be the watchword.

The prevention of recurring attacks of sickness is one of the most important problems for treatment and calls for our most careful consideration. General measures for such prevention may be discussed under the heads of Exercise, Bathing, Clothing and Local Surroundings.

Vigorous and properly directed "training" is an exceedingly valuable means in controlling the catarrhal tendency, and in fairly healthy young subjects, should always be advised. Walking, gymnastics and horseback riding are capital exercises. Wheeling, with correct posture, though exercising a limited set of muscles, may be followed and give excellent results when combined with suitable indoor exercise for the arms, back and chest. Light gymnastics may be carried out by those not sufficiently vigorous to take the heavier forms of exercise. You will be surprised and delighted with results of such exercise properly carried out, oftentimes when local measures had been tried to no purpose. So much for exercise.

Regular and frequent bathing, combined with daily cold sponging

ing of the face, neck and chest is decidedly beneficial in preventing colds, but a certain amount of precaution is always in order in the technique of the bath. Some constitutions will not brook a cold plunge under any circumstances, and in weak and catarrhal subjects such a procedure may be hurtful or the reverse of good, and during the winter months, especially, should be avoided. In such cases better energetic friction either with plain, rough, or salted towel should follow the bath, which should be as cold as the individual's nervous constitution will permit. Friction should be continued until the skin is decidedly reddened.

Patients with well marked catarrhal tendencies should wear woolen underclothing of sufficient weight during all seasons, garments of three degrees of thickness being required. The heavier weights should be put on with every marked fall of temperature, whatever the season. Underclothing of such persons, which has become damp from perspiration, should be changed as soon as possible, even if several times a day. Warm woolen garments also should be worn at night, a point very much neglected but very important; and in no case should clothes worn during the day be retained during the night. Woolen stockings should also be worn in the winter months.

Let us review some of the sanitary advantages claimed for woolen garments next to the skin.

1st. "Wool gently stimulates the skin;" *i. e.* to that degree necessary to excite and maintain its normal activity in secreting and extruding the waste matter, and surplus fat and water of the body.

2d. Wool, relative to linen and cotton, is a non-conductor of heat and electricity, and, therefore, tends to preserve to the animal body its normal measure of these vital energies.

3d. Wool, properly woven and made up, by reason of its permeability to moisture (the vaporous exhalation of the skin) promotes the elimination of the effete matters, and the reduction of the abnormal or excessive heat of the animal body; and this is the reason why *the body, even when freely perspiring, remains dry in woolen clothing*, while in linen or cotton it becomes wet—a fact of common experience with all who engage in athletic exercises.

4th. Wool thus co-operates with the skin to regulate, by its exhalations, the temperature of the body, the wool supplementing the efforts of the skin to dispose of excess of heat, whether proceeding from internal or external sources, thus maintaining that equable state which is the true condition of health and comfort. Hence it is that wool is better than linen or cotton as a preventive of the overheating of the blood through internal heat; and that woolen clothing is less oppressively hot than linen or cotton in



summer, and therefore more agreeable and healthful in the hottest climate.

5th. Wool is electrical, while linen and cotton are not : *i. e.* wool generates electricity but does not conduct it. It follows, therefore, that a body clothed in wool loses less of its animal electricity, while fresh electricity is produced on the surface. Most people are familiar with the facility with which the human body conducts electricity. Cotton ranks next to it as a conductor, while wool is classed with non-conductors and insulators, and for that reason is called an electric or generator of electricity. When the air is clear and dry, place a person upon a stool or chair, the legs of which are supported from the floor by glass tumblers, and beat him gently on the back with a woollen or camel hair shawl, and sparks may be drawn from his nose or fingers from one-fourth to three fourths of an inch long—or large enough to light the gas of a burner or charge a Leyden jar. Probably every one has seen and heard electric sparks on withdrawing a woollen stocking—never from taking off a cotton one. There is no manifest electricity in the latter case, because the cotton fibre conducts it away—dissipates it.

Woollen clothing is, therefore, salutary for those whose bodies are deficient in animal heat or electricity. With persons leading sedentary lives the action of the skin is deficient and it requires the stimulating aid of the woollen clothing, which materially assists in eliminating from the tissues the excess of water and fatty matter, always tending to accumulate when insufficient exercise is taken.

Chills caused by draughts or colds, damp clothes or bedding, are very dangerous, because the sudden suppression of the cutaneous exudations interferes with the circulation of the blood, thus disturbing the action of the lungs, the liver, the stomach, etc., and setting up conditions favorable to inflammation.

Their *modus operandi* may be summarized as follows :

The exhalations which are "mal-odorous" and noxious by reason of defective excretory action, are generated in the body during and after the digestion of food, during all vital action in fact, or when the body is invaded by the disease or the mind is at work or disturbed by worry, gloom, anger or fear, or indeed by any violent passion or strong emotion. For every act of mind or body is attended with destruction of tissue, constituting so much waste matter, which becomes poisonous and potent for mischief, if not duly eliminated from the body. This elimination it is the function of the skin, in an eminent degree, to do. The sudorific or sweat glands and their ducts are charged with this important office. There are about 7,000,000 of these little scavengers opening

at the surface of the skin of an average-sized man, throwing off the surface from 28 to 32 ounces of refuse matter every 24 hours. The action of even a small portion of them cannot be suspended without disturbance and danger.

The body not only gives off its exhalations to the surrounding air, but it also communicates them to all objects with which it and its atmosphere come in contact.

Metallic substances, glass and wood, of which the pores are closed by paint, varnish, etc., are practically impervious to the exhalations, while the two classes of material next mentioned absorb them, but in a very different degree.

I. All vegetable fibres, such as linen, cotton, hemp, jute, paper, unvarnished and unpainted wood, silk, attract and absorb these noxious, self-poisoning exhalations, and become, when in contact with beings, gradually offensive and even poisonous in their effect. Clothing (including linings and padding), and bedding made from such fibres, are agreeable and wholesome only when quite new and just washed, but soon become saturated with the noxious exhalations, producing discomfort, and, if wet, when the vapors are set free, becoming especially dangerous.

II. All kinds of animal wool and hair, feathers and horn, readily absorb all the excretions of the skin, but they do not retain them, but transmit and disperse them at their outer surfaces by a repulsive energy to which the self-cleansing properties of hair and wool fabrics are properly due. The value of this feature is hardly to be exaggerated.

Stout soled shoes should be worn in all weather, and the feet should be encased in overshoes on wet days, as damp feet are always a serious menace to persons of catarrhal tendency.

In regard to the local preventive measures to protect those of catarrhal tendency, or who catch cold easily, much may be said.

Bad air of all sorts acts as a direct irritant, and air laden with minute fragments of any hard substance, such as stone, coal or steel and dust, is injurious, and while not causing, scientifically speaking, colds, frequently sets up inflammation in the mucous membranes tantamount to this condition, and keeps the mucous membranes tender and sensitive. Breathing such air, of course should be avoided, and persons whose occupation compels them to breathe such an atmosphere should wear a respirator, or a flat, dampened sponge, over the mouth and nostrils while exposed.

So, in a paradoxical manner, Mr. Chairman, I seem to have told you how we catch cold by telling you how to avoid it.

## MALARIA AND ITS PREVENTION IN EASTERN CAROLINA

BY JULIAN M. BAKER, M. D., OF TARBORO.

(Read at the Washington Health Conference.)

The prevention of malaria is of importance to the economist as well as to the sanitarian. It is of special importance to us in Eastern Carolina, because, in some form, it exists in nearly every locality, extending far into the Piedmont section; because the mortality is greatly exaggerated in the minds of non-residents, and because there is a means of prevention which, if known and carried out, will surely eradicate it. It is constantly decreasing in New York, Philadelphia, Baltimore and most of the large cities as the knowledge of its nature and cause has become better understood, until at present it prevails to the greatest extent in low, marshy, country districts, principally in Mississippi, Arkansas, Louisiana and Texas. In Europe it has constantly decreased until at present its habitation is confined principally to Southern Russia and parts of Italy.

The influence of soil and climate in the production of Malaria is universally recognized, but as yet it is impossible to determine whether certain localities are malarial by any means other than by observing the effect which residence in those localities produces upon the Caucasian race. Low, marshy lands with an abundance of vegetable matter, heat and moisture, and summer and autumn, are favorable conditions for sustaining and developing the virus.

Malaria may be defined to be an "infectious disease, always accompanied by the hæmatozoa of Lavarani, and characterized by fever of an intermittent or remittent type, or by a chronic cachexia with anæmia and enlarged spleen." What the virus consists of occupied the attention for a long time, but after the observation of Klebs and Crudeli in 1879, additional interest was manifested in investigating it. The experiments of Lavarani in 1880, and their subsequent confirmation by Marchiafava and others in Italy, by Councilman, Osler and Joseph Jones in America, and more recently by French, German and English scientists, are conclusive that it is a parasite and belongs to the hæmatozoa. No observer, says Osler, who has undertaken the proper study of the blood in malaria has failed to recognize the parasite. Its nature and affinities are not definitely determined, but investigators in England, France, America, Italy and India are unanimous in the opinion that these bodies are always present in malaria, and that

they disappear simultaneously with the administration of quinine. The changes produced in the blood by them are sufficient to account for the symptoms and morbid anatomy. The transformation of the hemoglobin by the plasmodium results in the pigmentation which is so characteristic. The ameba passes through a cycle of existence, during which toxic substances are developed, possessing the property of causing a necrosis of the red corpuscles, resulting in anemia.

How the parasite enters or leaves the body: how and where it is propagated: whether it develops in some aquatic plant or animal, is not determined: but the study of its life as revealed by clinical experience leads to certain conclusions which future investigation will doubtless confirm.

The term malaria means "bad air." This indicates the long accepted origin of the disease, and indicates the avenue of entrance to the respiratory tract, or the skin. If a micro-organism is the cause, as is now conceded, and its habitat is fermenting organic matter in the soil, it is certainly a reasonable conclusion to arrive at that the entrance could be more readily effected through the mouth and the digestive tract than by either lungs or skin. It is well known that the system succumbs more readily to malarial influences while fasting: doubtless this is explained by the fact that the micro-organism has to reach the alkaline intestinal tract before developing its pestilential manifestations, and this is more easily done through an empty stomach than a full one, with the protective influence of active gastric digestion. If it is true that the usual avenue of entrance is the mouth, the entrance into the blood must be made through the intestinal tract, and the prevention of the disease and its total eradication is brought within the region of possibilities. Instead of contending with a hydra-headed micro-organism pervading every breath of air we breathe, lurking in every evening breeze, whose whereabouts we know nothing of, we would have a simple little parasite trying to get into the intestines through an empty stomach.

The topographical and meteorological conditions in Eastern Carolina furnish a most suitable environment for the life of the malarial germ: so our effort must be directed primarily to the prevention of the development of the germ outside of the body, and then its entrance into the body. Notwithstanding the fact that Sternberg failed to find the germ in the marsh mud of Louisiana, the low marshy lands of the Roman Campagna, the bottom lands of Mississippi, Arkansas and Alabama, and the low lands of our section are too familiar as favorite localities for the worst forms of malaria to controvert the fact that heat, moisture and decomposing vegetable matter constitute the favorable environment which we

must first remove in order to prevent the germ's development. It is inexplicable at present that these marshes and low lands have been known to become healthy without apparent change in previously favorable conditions for development: it is highly probable, though, that the germ will never disappear unless the environment is changed. Clearing, draining and cultivation will accomplish this in a measure. Oxygen being necessary, as claimed by Crudele, to the existence of the germ, close sodding with grass after drainage is the best sanitary cultivation. The Carolina poplar or cottonwood tree, eucalyptus and several others, have gained a reputation as absorbers of the virus from miasmatic atmosphere; doubtless one tree is as good as another for this purpose, and the claim of those mentioned is referred to only to deny it absolutely. The usual avenue of entrance being the intestinal tract, although a respectable minority still hold that it is the lungs and skin, how is the germ to be prevented from entering the system? Bartley, of Brooklyn, has recently found the malarial organisms in the drinking water from the source of common supply of the city of Brooklyn, which only serves to establish what was already accepted—that water is the most efficient carrier, and when containing the surface washings charged with decomposing organic matter was a satisfactory abiding place and furnished a suitable pabulum, not only for malarial, but many other pathogenic organisms.

In Eastern Carolina the water supply is principally from shallow wells, ten or twenty feet deep, in wet seasons the water rising very near the surface level. The question of prevention resolves itself into one of purifying the water from shallow wells, or getting purer water from some other source. By boiling the well water all vitality is destroyed and dead organic matter is harmless. This is the only safe rule if any well water is to be used. The custom prevails in some malarial sections to boil enough water in the morning for the day's consumption. After boiling it should be placed in a porcelain cooler and closed up. By using only boiled water the malarial attacks may be reduced to a minimum. It is a matter of common observation that, in families using boiled water, those who, for some reason, do not drink it have been known to have malarial attacks while others escaped.

Purer and better water can be obtained from deep bored or driven wells and cisterns. When proper care is exercised in collecting, no better water can be procured than cistern water. The Board of Health has done great good in disseminating information in regard to bored wells. They are coming into more general use, and wherever used malaria prevails to less extent; but the pump gets out of order, is troublesome to repair, and doubtless,

too, after a while, unless very deep, these wells become contaminated and their use is discontinued. Artesian wells, where practicable, will fill all the requirements of pure drinking water, except in very rare instances. Their use is beginning to attract attention everywhere. Experimental wells are being sunk in many places, and no good reason exists why artesian wells should not be generally used in our section.

Eastern Carolina needs purer drinking water. This can be obtained by boiling ordinary well water, by using cistern water properly collected, deep bored or artesian wells. Let our people realize this and put it into practical operation, and Eastern Carolina becomes at once the healthiest, the richest and the grandest section of our commonwealth.

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## THE BOARD OF HEALTH AND THE PUBLIC—THEIR RECIPROCAL RELATIONS.

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BY GEORGE GILLETT THOMAS, M. D., PRESIDENT OF THE BOARD.

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(Abstract of Paper Read at the Charlotte Health Conference.)

Responding to the address of welcome by Dr. H. M. Wilder, Superintendent of Health of Mecklenburg county, Dr. Thomas said:

For the State Board of Health I thank you for your kindly welcome to your flourishing town. I would like to say, before submitting what few remarks I have, that we felt in coming to Charlotte for our conference that no city is as large, thrifty and energetic as Charlotte. We would like to make our presence here as agreeable as possible, and make this a working meeting. We have called these meetings conferences. We would like to make them as profitable as possible, and with that end we desire that, if there is any point which we can elucidate, you will not hesitate to ask questions.

We are a self-invited body in your midst, carrying out a plan that was inaugurated two years ago of instituting conferences with the citizens of the larger towns and cities of the State upon matters pertaining to the sanitary conditions that must interest all good people. We do not believe that we are any the less welcome because we have asked ourselves into your flourishing community, and we are gratified that you should honor our coming with such an intelligent and interested gathering. The circulars

which announce our program also request that this meeting shall be resolved into a conference in fact, and that it is the wish of the Board that any one of you who desires information on health matters that it is supposed we are in possession of will ask for it, either by direct question or through the question box which has been provided. I wish to ask your attention for the few minutes that are accorded me to a short discussion of the relations of the Board of Health and the people of the State. The fact that doctors not only make a living among you, but that the number of doctors seems to increase, is fairly good proof that there is need for preventive as well as curative medicine in this honorable and ancient borough.

The duties of the sanitary or health officers are so manifold that they involve a knowledge of pathology, because this science implies an exact study of the causes of diseases in their relation to the living human body. A knowledge of vital statistics, involving an accurate account of the population, the births, deaths and diseases, is held necessary for the purpose of enabling proper comparison to be made which would give evidence of the effect of the various conditions on the population. It implies a knowledge of chemistry and the use of the microscope for the purpose of judging of the impurities of air, earth, food and water, and the chemistry is to help in the application of deodorizing and disinfecting agents. It necessitates such knowledge of natural philosophy as will aid in providing for ventilation and atmospheric changes, and for the proper government of such manufacturing processes as are alleged to be hurtful to health. This complex knowledge makes it incumbent on Boards of Health to be provided with physicians, chemists, engineers and men who will devote all the time necessary to laboratory investigation.

The composition of the board demands the presence of several practitioners of medicine, an engineer and a chemist. The law provides for the foundation of county boards of health, to whom is given the authority to elect the superintendent. To him is intrusted the safety of the people whose servant he is. He is made by law the master of the situation when infectious disease or diseases dangerous to the public health appear. He is responsible for the quarantine and disinfection of diseases named in the law, and if he perform faithfully the part laid out for him, his office is no sinecure, nor his lot an easy one.

Provision is made in the statutes for the gathering of vital statistics—a most important item, one of value for comparison at the headquarters, and for the information of local health authorities.

The State Board of Health considers itself bound to do all in its power to back the people—to protect them and provide for their sanitary betterment.

In return, they ask of you citizens of a town that boasts, with justice, of its enterprise, thrift and growth, to see that its laws and they are the laws of the State, are obeyed.

No town with the reputation of Charlotte can afford to be lag-gard in the strife for general good.

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## PUBLIC WATER SUPPLIES AND THEIR PURIFICATION.

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BY J. C. CHASE, OF WILMINGTON, ENGINEER OF THE BOARD.

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(Read at the Charlotte Health Conference.)

The character of the water furnished for public use is a matter of the highest importance to all concerned, and it is hardly necessary to say that the source of supply should be above reproach. Yet such is the general public indifference that, were it not for the never-ending missionary work of the physician and sanitarian, our land would stand a fair chance of devastation by filth diseases that would rival the death-dealing plagues of former times.

The completion of a system of water works, the source of supply being of a satisfactory degree of purity, is too often considered as a final settlement of the water question. So far as the public health is concerned, a polluted water supply is likely to be more detrimental than the former supply drawn from local wells, for these would be likely to be of varying degrees of badness, and a general epidemic of sickness would hardly be likely to ensue. However, this should not be considered as a valid reason for continuing to rely upon the wells, but rather as an incentive to labor for a higher standard of purity in the public works.

To consider the question from a financial standpoint solely, no city can afford to tolerate a water supply that is known or suspected to be detrimental to health. The loss of time, which is money, caused by the resulting sickness, the expenses of nurses and medical attendance, the loss to the community by death of actual or prospective wage-earners, soon amounts in the aggregate to a sum far in excess of that required to secure and maintain a water supply of unquestioned purity.

One typhoid patient poisoned the water supply of Plymouth, Pa., in 1885. There were over 1,100 cases of fever in a population of 8,000, and 104 deaths resulted. A careful calculation showed that the care of the sick and the loss of wages by those who recovered



amounted to \$97,120. Those who died were annual wage-earners to the extent of \$18,420.

These startling figures need no elaboration or explanation: they speak for themselves.

Comparatively few persons in any community have a realizing sense of the necessity of maintaining perfect sanitary conditions about every public water supply. Until a growing sanitary sentiment controls a majority of the votes needed to elect the governing officials of our cities and towns, we are destined to be subject to the rules of those who do not see the wisdom, even from a business point of view, of doing everything within reason to raise the standard of public health. It is certainly within bounds to say that any public officer who passively allows, without protest even, the continued use of a polluted source of water supply, is morally responsible for the natural resulting consequences.

Not less difficult of solution is the question of securing a satisfactory supply of water when the ownership of the water-works is corporate instead of municipal. In that case we have a commercial condition to deal with in addition to the sanitary indifference before mentioned. We shall undoubtedly be told that the consumer's interest is the company's interest, and that the company cannot afford to furnish that which the consumer does not desire or approve of: but if we get behind the scenes we shall more than likely hear the consumer being told that he is hypocritical, and that if he is not satisfied with the fluid that is being dispensed to him he is not obliged to take it, but can procure his supply elsewhere, if he can.

The recent civil suit against the water-works officials of Duluth, Minn., to recover damages for a death by typhoid fever, which, it is claimed, was caused by the impure condition of the water supply, is a radical move in the right direction. It will have a tendency to develop a feeling of responsibility in the minds of such officials, and, we trust, lead to a more careful oversight of water supplies.

Some one has said the wrecking of savings banks and the robbing by employees of the postal service were two crimes that could not be punished too severely, as a large majority of the victims had no way of protecting themselves from loss. The furnishing of an impure supply of water, by either indifference or negligence, is worthy of a place in the category of crimes above mentioned, and we see no good reason why an offence that menaces health and life should receive a lighter penalty than one against property alone.

The development and growth of the water-works business, if it may be so termed, has been almost phenomenal. In 1870 there

were only 243 systems of public supply in the United States. Now it is safe to say that there are in the neighborhood of 2,800, representing an aggregate outlay of \$200,000,000.

A quarter of a century ago, a city of less than 25,000 inhabitants hardly dreamed of a public water supply: now, scarcely a hamlet but what aspires to have this great convenience, which has passed from the domain of luxury almost into that of necessity.

In the State of Massachusetts 154 of the 353 cities and towns have water works: every place with a population of over 4,500 being supplied, and only 11 with a population exceeding 3,000 being unprovided.

Perhaps it is not too much to assume that this somewhat abnormal growth of the business has been no small factor in creating a demand for improving the condition of the supply. In the more thickly settled sections of the country it is getting to be no easy matter to procure a supply of satisfactory quality within a reasonable distance.

The earlier enabling acts for the construction of water works passed by the Massachusetts Legislature specified "*fresh*" water: later ones called for "*soft*" water: then came a period of "*pure*" water, until the supply was exhausted, and now they simply call for "water." There is food for reflection for us in the question as to what we are getting. Is it *fresh*, *soft* and *pure*, or merely water? If ignorance is bliss, perhaps the inquiry should not be pressed.

The Metropolitan water supply has recently been inaugurated for the benefit of Boston and the neighboring towns within a radius of ten miles. An expenditure of \$20,000,000 is contemplated, the supply being obtained from a distant water-shed that is practically free from pollution, and whose ultimate limits will furnish the supply that will be required a hundred years hence. It is only a question of time when the same course will have to be taken by the other large centers of population in our country.

The sources of supply may be placed in two general classes, surface and ground water. The surface supplies are derived from lakes and ponds, running streams or the impounded waters of those whose usual flow is not sufficient in quantity to supply the daily demand in the driest season.

Natural lakes or ponds usually afford the most desirable supply, and if situated at a distance from habitations, or in an uninhabited territory, the water is generally of good quality and reasonably free from actual or prospective pollution. Still, it is not safe to assume that once pure, always pure, and the only certain way of keeping track of the condition of the supply is to have frequent and regular analyses, both chemical and bacteriological.

It is the unexpected which always happens, and there are several instances where a first-class supply has been seriously polluted by the filth of a single family. A noted sanitarian well says :

"No one point in sanitary science has been more conclusively proved than that a given water supply may be safe to-day, and dangerous to-morrow, and safe again a week later. It is not in the water, but in that which the water transports, that the danger lies. A sudden shower may foul the wayside spring. A picnic party may cause the contamination of a mountain brook."

When the supply is drawn from a running stream that receives the household and mechanical wastes of another center of population, we are confronted with a state of affairs that calls for vigorous condemnation. It is a well-defined condition, not a theory.

There is very often a variance of opinion regarding the actual status of some particular source of supply, when it may not be practicable to show that it is positively deleterious to health. Interested parties will be prone to belittle any objections that may be raised, and very often will dispute evidence that should pass uncontradicted.

It is a well-settled standard that waters that can be shown to contain any substance that is deleterious to health are unfit for domestic use. The determination of this fact is the province of the water analyst, and his final decision must be authoritative.

It is also proper to require that the supply shall have no offensive associations or characteristics, although they may be matters of sentiment rather than fact. Boating, bathing and fishing in the bodies of water from which the supply is drawn would come under this head. Of course the smaller the body the greater the objection, both as a matter of sentiment and fact. The turbid waters of streams are also objectionable on the same score, even though they contain nothing more detrimental than the earthy matter held in suspension, which is removed to a great extent by sedimentation before it reaches the consumer.

The highly colored waters of the South Atlantic Coast can be placed in the same category, although they may contain nothing that is really objectionable.

The prevailing sentiment requires a colorless, odorless, and tasteless water supply, of a proper degree of purity. While such a supply in its natural state may not be easily obtainable, the improved means of purification now available make the requirement one that can be and should be satisfied.

Ground water supplies are obtained from springs or wells of different types, the natural filter gallery, so called, being virtually an enlarged well. These supplies are usually of good quality, and are practically nothing but filtered surface water. Geological

conditions play an important part in settling the question of securing supplies of this nature, and comparatively few are thus derived. The water very often possesses a degree of hardness that is tolerated because nothing better can be had.

Supplies drawn from wells are not always free from danger of pollution. If the wells are shallow and located at no great distance from contaminating influences an excessive draft which, sooner or later, is very likely to ensue, will cause practically the same pollution that would be found in a surface supply in the same locality. A case of this kind has recently come under the writer's observation.

Artesian well supplies are generally free from organic contamination, but usually carry in solution an amount of mineral matter that renders them unsatisfactory for general use. There are notable exceptions, it is true, but a very small per cent. of the water supplies of the country are obtained in this manner, and the geological conditions in many localities preclude the idea of any great increase in the number.

Where a supply of a satisfactory quality is not available, or the existing supply has become contaminated, the question of purification becomes a vital one. In the early days of water-works construction comparatively little attention was given to the purity of the supply. A single analysis was usually made, and if the result showed that the supply was of a satisfactory quality the question was considered settled for all time. Bacteriology and nitrification, like the telephone and electric light, had hardly begun to occupy the realm of the imagination, and the only purification of public water supplies considered necessary was the removal of matter held in suspension, as in the case of turbid rivers. This was usually done in an imperfect manner by sedimentation in large settling basins.

The halcyon days of blissful ignorance have gone never to return, and now the sanitarian does not feel satisfied as to the condition of the supply unless it is analyzed several times a year. We confidently expect, however, that the discovery of a successful way to eliminate all known pathogenic bacteria will only be the signal for the advent of others equally as detrimental to health.

The filter beds that are in general use in Europe never flourished on American soil. In fact, the subject of filtration has received comparatively little attention on this side of the water until within a very few years, and at the present time there are in the United States less than one per cent. as many users of filtered water as are found in European cities.

Several attempts were made to procure supplies from natural

galleries adjacent to large streams, but the results were far below the expectations, and it was generally found that the supply obtained came from ground water intercepted on its way to the stream instead of from the river itself. This method has been generally abandoned altogether or supplemented by other devices.

Within a few years a growing sentiment in favor of purification by filtration has taken root, and many supplies are now being filtered whose original condition was much superior to that of many now in use whose quality has never been questioned.

Filtration in general is not a matter of experiment, so far as the results are concerned, but purely one of cost, which is by no means prohibitive.

It is perhaps too much to expect the general adoption in this country of the elaborate and costly devices that are used to such an extent in European practice. We have, however, thanks to American ingenuity, several varieties of apparatus known as mechanical filters. While the devotee of filtration in its strict sense would be inclined to resent that name being applied to the devices, holding that strainers would be a more appropriate term, considering the speed with which the water is passed through them, the fact cannot be disputed that they have as a class done efficient work, and are fully entitled to the name of filter, which, in its broad sense, is a water purifier.

Their efficiency is largely increased by the use of some coagulating agent, commercial alum being the substance most generally employed, although lime and ferric salts are sometimes used. The function of the coagulant is to form by decomposition a gelatinous precipitate, which draws together and surrounds the suspended matter present in the water, and by increasing its bulk makes it much more easily removed.

This type of filter using coagulants has been very successful in removing bacteria, and the opinion is ventured that it will be the only type of filter that is commercially available for water-works systems of small size. The large and wealthy cities can well afford the expense of the costly structures of English and Continental practice, but the salvation of the smaller systems of this country will undoubtedly depend upon the mechanical filter.

We may note, however, that several cities of good size in the South and West are firm believers in the merits of mechanical filtration, notable examples being Atlanta, Chattanooga and Knoxville. There is one well-settled principle in filtration, and that is that it must be done at the fountain head. We cannot afford to have a polluted water supply for general use, and trust to the integrity and intelligence of the ordinary house servant to keep the filters in running order and see that an unpolluted

drinking water is supplied. The one omission may be the death-warrant of some loved one, and unavailing regrets for careless inattention to a specific duty bring not back the departed.

An outbreak of typhoid fever in a Massachusetts city was traced to the drinking of the impure river water. Irreproachable water from the city supply was in the factory, but the carelessness or indifference of the help led some of them to use this river water, because it happened to be a little more convenient.

The recent investigations of the Massachusetts State Board of Health, relative to intermittent filtration, are of profound interest and great importance.

The investigation has extended over a period of several years, and is not yet concluded. The usual type of bed filter has been used, but the principle has been developed that the intermittent application of the fluid to be filtered produced the best results. The filtering material thus has a chance to drain, and, becoming thoroughly aerated, the tendency to nitrify and destroy organic life becomes stronger, and under proper conditions the bacteria die much more rapidly in the aerated sand. This method was originally designed for the treatment of sewage, but the results were so successful that the city of Lawrence decided to construct a filter plant on this plan for the purification of the city supply. A filter bed with an area of  $2\frac{1}{2}$  acres has been in operation for some three years, and the mortality from typhoid fever has been decreased 40 per cent., at least one-half of which can be credited to the filter.

The practical results of purifying a polluted water by filtration are shown by the experience of Hamburg and Altona in the cholera epidemic of 1892.

The water supply of Altona is polluted to an unusual extent, the river Elbe at that point carrying the crude sewage of three-fourths of a million people; yet such was the efficiency of its filters that they scarcely felt the effect of the cholera, which made such ravages in Hamburg. The natural conditions in Hamburg were far superior to those in Altona, as the Altona intake was below the sewage outfalls of both cities, while the Hamburg supply was contaminated by neither, only being subject to the natural pollution of the stream before it reached the city.

Altona's supply was filtered while Hamburg's was not. The sacrifice of over 8,000 lives was a dear object lesson; but if "the blood of the martyrs is the seed of the church," they died not in vain, for Hamburg now has an efficient filtration plant, with a result that the death-rate is the lowest ever known.

A few words about the water supplies of our own State may not be out of place at this time. Of the sixteen systems, three draw their supplies from artesian wells, a deep well and springs; two use the

ponded water of small streams, one of which has built a filter well, which undoubtedly has and will continue to have for some time to come a more or less beneficial effect upon the supply. The other one would probably be improved by like treatment, although the existence of any pollution is not apprehended. The other supplies are surface waters from streams of varying size and character, the most of them not being above suspicion, and all of them in their natural state being susceptible of great improvement, certainly so far as appearances are concerned.

Eight of this class are supplied with filters of the mechanical type, which certainly improve the looks of the supply.

We note with pleasure the marked increase of interest in improving the quality of the supplies, whatever may be its inciting cause, three of the filters having been installed within two years.

As to the quality of the work done, "that is another story," as Kipling says, and I am not in a position to speak with authority. Suffice it to say that the installation of filters is only a means towards an end, and upon their intelligent operation depends the success of the venture. An uncared for filter may become a prolific source of disease.

To sum up, the large majority of our public water supplies are of uncertain or suspicious character. In the natural course of events they will grow worse instead of better. However, with a growing sentiment requiring a higher standard of purity, it is perhaps not too much to predict that a generation hence the purification of public supplies will become well nigh universal, and that the sanitarian of that day will be able to chronicle as great an advance in the purification of water supplies as the past twenty years has shown in their development.

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## NORTH CAROLINA'S INSANE.

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### CAN THE STATE CARE FOR THEM?

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By P. L. Murphy, M. D., Superintendent of the State Hospital at Morganton.  
(Read at the Charlotte Health Conference.)

Statistics are said to be unreliable. This is true of the insane population of North Carolina, as will be seen, and yet there is no other way to arrive at any conclusion upon which to base an opinion. The census of 1880 shows the population of North Carolina to have been 1,399,750. The number of insane were 2,028, or one insane person to every 690.2 of inhabitants. In 1890 the population was

1,617,947. The number of insane was 1,725, or a small fraction less than one insane person to every 938 of inhabitants. If these figures are true, we have a fast-decreasing insane population in this State.

Are they true? is a question of the greatest interest to us. I greatly fear not. For reasons which do not concern us now, great doubts are entertained of the correctness of many of the census returns. A sample of this is found in the report of the Board of Charities of the State of Illinois for the year 1873. The chairman of the Board, Mr. Wines, shows in this report that the number of insane in Illinois was 3,005 instead of 1,625 as returned by the census enumerators. He, besides this glaring error, discovered on the lists returned to the Superintendent, General A. F. Walker, 123 names counted twice.

Further comparisons will be made, taking the census reports as a basis, to show that it is more than probable that there is less insanity in North Carolina than in the general population of the United States. We have seen that the proportion in North Carolina in 1880 was one lunatic to every 690. In the United States, taken as a whole, it was one to every 545. In order to obtain correct information upon which I could base some reasonable conclusions, a circular letter was sent to the Superintendent of Health, to the Chairman of the Board of County Commissioners, to the Clerk of the Superior Court in every county in the State, enclosing a form for reply and a stamped envelope. Replies were received from 22 of the 44 counties of the Eastern district and 37 of the 52 counties of the Western district. Having made such a complete failure in collecting information on this subject from all over the State, I have decided to limit myself to the white insane of the Western Hospital district, for the reason that I am more familiar with the white insane of this territory, having had opportunities to gather information of large numbers outside the walls of the hospital at Morganton. Even with these opportunities the statistics collected are incomplete, but surely true as far as they go, certainly representing the minimum of the white insane in Western North Carolina.

From the 1st of August, 1895, to the 1st of August, 1896, 113 males, 15 females, total 271 persons, were legally committed to the hospital; of this number 77 males, 98 females, total 175, were admitted; 25 males and 44 females were for various reasons refused admission; 11 males, 27 females, total 38, were ordered admitted, but their friends declined to send them. Of the number refused admission 12 males and 3 females were either idiots or dotards, and manifestly from our laws, surely under the existing circumstances, were not proper subjects for hospital care; 16 males, 41 females,



total 57, would have been admitted had room been abundant. Almost all the males and a few of the females who were refused admission were epileptics. Many of these women actually need hospital treatment; a few, with all the men refused, only custodial care. I learned from the several replies received in answer to the circulars that in addition to the above there are 31 men and 44 women in the 37 counties heard from. Assuming these 72 persons to be proper subjects for the hospital, we find 47 men and 82 women, a total of 129 persons outside the hospital who should have either its treatment or its care. At the time of writing this paper there were 692 patients in the hospital, a total of 821 in the district, whose names can be called. This does not include the persons whose applications were made previous to August, 1895. Some of these are yet at home, and others for whom commitment papers have not been made are known to be waiting for hospital care as soon as room can be had for them. It can be safely estimated that there are now not less than 250 white insane persons in this district not in the hospital, the large majority of whom should be under its care. By calculating the Western district as two-thirds of the State, the whole of the white insane can be estimated near enough for our purposes. Taking the highest figures of all these estimates, our State falls far below any other civilized country known in the number of its insane. It will, I am sure, be of general interest to pursue this subject farther and to quote from various writers.

Mr. F. B. Sanborn says "that in Massachusetts in the last thirty years the population has doubled while the number of insane has trebled." The editor of the *American Journal of Insanity*, in referring to a discussion on the subject of the increase of insanity, says: "So uniform is the story that has come for years past from every civilized country that a person who abides by facts, be they pleasant or unpleasant, rather than by cheerful theories, has no choice but to believe that insanity is increasing at a rate quite out of proportion to the rate of increase of population."

It is not universally conceded that insanity is so rapidly increasing as it appears from the increasing demand for hospital care. Without going into that any further, it is some comfort to know that perhaps after all it is not as bad as it appears. It is an unquestioned fact that, with the better care lunatics receive now, they live longer than formerly; that in many countries more accurate enumeration is made; and that this, at least, accounts for part of the apparent increase. Your attention is drawn to the fact that from both sources of information, to-wit: the number who sought room in the hospital, and from those reported in reply to the circular letter, more women demand room than men. This,

notwithstanding that there are 40 more women in the hospital. This is so noticeable, and, besides being interesting, is so important that I venture to give more detailed facts. From the opening of the hospital at Morganton to the end of the last fiscal year, December 1, 1895, 1,833 patients have been admitted, 894 men and 939 women. The census for 1890 shows perhaps a larger relative population of insane women in the state, viz.: 755 men to 960 women. There are some 20,000 more females than males in the state, but this does not account for the large difference.

Regis in his book, "Practical Manual of Mental Medicine," says in general statistics of insanity that the male sex figures more largely than the female. The proportion is 114 to 129 males to each 100 females. This includes cretinism and idiocy, which are more frequent in males. If these are excluded, which is done in the above statistics of North Carolina, a certain equilibrium is re-established. "If we go further," says he, "and take out all the cases of general paralysis and alcoholism, we find that pure insanity is more frequent in the female than in the male." Other authorities claim that the proportion becoming insane is practically the same. This, perhaps, includes alcoholism and general paralysis, both of which are rare in North Carolina. There are other reasons why the number of insane women is greater, even admitting the same number are attacked, and there are reasons, too, why more seek hospital care. Society demands protection for women who by disease have been deprived of the inborn instincts which guard them against vicious and lewd men. This is best accomplished by sequestration. By reason, too, of their physical organization women need better protection from the vicissitudes of life. Prof. Alonzo Clark, in his lectures to his classes, always repeated this proverb, which he had originated, "A man and a dog can live afield; but a woman and a cat must have a home."

Many men really insane are competent to make a support for themselves and sometimes for their families, whereas women are an additional burden. The chiefest of all reasons is, however, that more insane men die and more recover than women.

The statistics in the hospital at Morganton for twelve years show that of the 894 men admitted 356 recovered, nearly 40 per cent., and 149 died, 16.6 per cent. Of 939 women, 363 recovered, nearly 39 per cent., the exact difference is 1.1; and 149 died, 15.8 per cent., something less than a difference of 1 per cent. This apparent trifling difference shows larger in large numbers, and is a consideration. Whatever the causes may be is immaterial to our present purpose. It is a fact that there is a greater demand for

admission of women in the Western North Carolina Hospital District.

Having shown, if indeed it needed further demonstration, that there are a large number of insane people in North Carolina that need hospital and asylum room, it remains to show how this can be supplied, the best means to provide for them, and after that the cheapest. The limits of this paper will not permit a thorough discussion of all the phases of this important question. I must, therefore, assume many of these to be settled, or, at all events, it is the experience of those who have given them the most serious study.

The State of New York in the late sixties or early seventies made a new departure by establishing an asylum for the chronic insane at Willard.

After 10 or 15 years of trial the experiment was pronounced a failure by its previously warmest advocates. The next trial was in Pennsylvania, at Wernersville, on a new plan. It was proposed to profit by the mistakes of New York, and the advocates of the Wernersville plan were sanguine that at last the great problem was solved. So far it has not been the success its friends hoped for. However that may be, North Carolina is not in a condition to make costly experiments, and that project will be dismissed as not feasible. County care ought to be summarily disposed of by saying it has been tried and found wanting in every State and in every country, but it has some advocates in this State, and perhaps a short space should be devoted to it to show its undesirability, its cruelty to the helpless insane and how utterly at variance it is with the spirit of the age and the humane feelings of our best people. It is not necessary to go outside our State to find examples of cruelties and barbarity worthy only of the darkest age, and yet our people are not cruel or parsimonious to the extent of allowing cruelties and barbarities practiced on the helpless insane, nor are they indifferent to the sufferings of these afflicted people. It is rather because the great mass of our citizens are not aware of the real state of things, or are unable to correct this great wrong.

Every one who has looked into this question, and who desires the best care of the insane, believes that the State ought to assume charge of them. The counties will not, indeed cannot, care for them, asylums (limiting the meaning of that word to institutions for chronics, which it means) have proved unwise and have been discontinued almost everywhere. There remain three other systems, the boarding out or Scotch system and the colonization near present hospitals and the separation of the criminal and very dangerous insane from the innocent and comparatively harmless.

We may dismiss the first in a few words. Only mild lunatics

can thus be cared for, and then there would be little or no economy in this. The plan has been tried in Massachusetts in a limited way, probably as many as 100 out of 7,500 being cared for in this manner. In as sparsely a settled State as North Carolina, it would be almost impossible to have State supervision, which is essential to properly carry out the plan. The colony plan and the establishment of an institution for criminals in the penitentiary I believe are the only ones that can be adopted in this State that will afford the relief desired, and yet be within the means of our people. "Prodigality," says Dr. Wise, of New York, "in expenditure of tax funds for eleemosynary purposes is not only a wrong principle but its reaction upon political and public sentiment retards and injures the object we are seeking to effect, as the history of provision for the insane in several States clearly illustrates."

It is to the interest of the insane themselves that those whose duty it is to try to provide for them should studiously avoid any waste of the means our taxpayers are willing to give for this purpose. This idea will be kept constantly in view in the recommendations to be made. I must ask again that some axioms mentioned be accepted as true. They are not my opinions alone, but the combined wisdom of those physicians who have spent their lives in hospitals for the insane. It is impracticable now to build another institution in North Carolina. The insane must be provided for, then, by the present institutions. There should be one acre of land belonging to the hospital for every patient cared for. It is not possible without a greater outlay of money than can be afforded to buy sufficient land contiguous to that owned by the hospitals, but land not further away than five miles (the nearer the better) may be bought cheap enough. On these outlying farms colonies for both men and women can be established in not expensive cottages, and farming and other operations can be carried on just as is now done at the central institution. One of the great expenses connected with the hospitals for the insane is the necessary officers to conduct the business of the establishment. There will be no need for another superintendent, steward, matron, engineer, farmer, etc., it being easy to conduct these colonies under the management of the central institution, the expensive administrative building, barns, store-room—a very costly part of every hospital—having been already provided.

The criminal insane will be disposed of before going further into the colony system. Several of the States have had for years separate institutions for criminals. The persons confined in these represent three classes: Penitentiary convicts who become insane while serving terms in the State prisons, persons who are tried

for crimes, who are found to be insane at the trial, or to have been insane when the criminal deed was committed, and those well-recognized lunatics who commit deeds of great violence while in the hospital or at large. The penitentiary of North Carolina is ample enough as it is now used to easily and cheaply care for all criminal insane. There is no need to employ any other officer or to erect any other building. The present hospitals would get rid of a dangerous class of lunatics, who are a menace to the whole house, and thus lose to a greater extent the prison idea of the hospital, a condition desired beyond measure. There are 26 criminals now in the State Hospital, and they occupy the most valuable and the most needed room in the institution. If the judgment of the court was confinement in the asylum for criminals for life, we would hear less of the plea of insanity in murder trials.

In order to properly understand the comparative cheapness of the colony system, a full knowledge of the cost of the present institution should be had. The cost of the hospital at Morganton before the additions of congregate dining-rooms and cottages was about \$900 per bed, or \$900 for every patient accommodated. The one at Raleigh was about the same, the one at Goldsboro about \$500 per bed. Throughout the United States the average is even larger than this; perhaps \$1,200 per bed would not be an exaggeration.

The trial of cottages near the present building at Morganton has been made at a cost of something less than \$200 per bed. There was practically no cost for water, and very little for plumbing or disposition of sewage in this. I believe, including the cost of land, and if water is convenient, cottages for 400 to 1,000 patients can be erected for \$250 per bed, or even less. If the State would adopt this plan systematically and, say, appropriate small sums yearly, the work could be done for even less than \$250 per bed. A large cost of building is the brick, and by establishing a yard with brick-making machinery, the cost of brick could be reduced to nearly one-half our present prices.

Much, if not all, of the work of making brick, and the excavating, can be done by male patients, and thus still further reduce the cost. The advantages do not stop with the erection of the cottages in less costly way than has heretofore been followed in this State. The Pennsylvania Lunacy Commission, in advocating the establishment of an asylum for chronics at Wernersville, claimed for it the advantage that the patients would make it nearly self-sustaining, because the quiet working patients would be taken from all the hospitals in the State and sent to Wernersville. In short, none but producers

would be sent there. The commission did not seem to consider that the other hospitals would lose by being deprived of their working patients, and that quiet, working patients are subject to attacks of violent excitement. It is a fact, I am told by one who knows, that such is really the case. The management of the older institutions is hampered by having their organized working parties broken up. There is a constant going of quiet patients from the hospitals to Wernersville, and of greatly excited ones back to their respective institutions. This is not only inconvenient but expensive. In the cottage plan proposed these transfers could be made without cost, and without interrupting in any way the ordinary everyday workings of the organization. At one time it was customary at Morganton to send home the so called harmless and incurable to make room for acute cases and those who were violent and dangerous. This is not now resorted to if it is possible to avoid it. It is only a question of degree: every insane person may with reason be called dangerous. During the month of September last a so-called harmless lunatic in North Carolina made a desperate effort to wreck a train. A harmless lunatic who left Morganton hospital went home and killed one of her children within a month.

The cottage plan has been tried to a greater extent at Kalamazoo, Michigan, than in any other institution in the United States known to the writer. A letter addressed to its accomplished superintendent, Dr Wm. M. Edwards, asking for information as to this system, elicited this reply: "As long ago as 1886 the board of trustees of this asylum (Kalamazoo), failing to secure land contiguous to the location of the main buildings, purchased a farm of 176 acres two miles and a half distant. Afterwards 80 acres were added, making the present size 256 acres. On this was built a wooden house and a large barn, and we began the experiment of producing our own milk. We now have 56 cows there, largely Holstein grades. Forty-seven male patients, of the chronic, laboring class, live there. The farm is under the supervision of a man and his wife, and with the help of two other men and two other women, all the work of caring for the patients, cooking for them, attending to all these cows and to the farm and garden work, there being several acres of the latter, is done by this help and the patients before mentioned. This experiment proved so successful that a year later the trustees bought another farm of 357 acres. On that there are now four brick houses and 250 patients; 67 men and 183 women reside there. There is a resident physician who superintends the whole of the 'colony,' as it is called. As the patients are mostly of the class before mentioned, there is not a very great deal of active medical work. There are

however, frequent calls for a physician, the maintenance of discipline and other matters incident to the care of so many persons, which keep the doctor busy during the whole time. Patients living in the cottages assist with the ordinary housework; cooking is done within each cottage, and on the whole living is more satisfactory than within the main building. The patients, as a rule, improve in general health by being transferred to the cottages; the outdoor life that most of them lead renders them more robust, and there is greater contentment than in the larger institutions. We find, also, that maintenance is cheaper in the cottages, but I attribute this largely to the fact that the class of patients there would be more easily maintained wherever they are located than the more actively disturbed and destructive chronic cases. Among the drawbacks to our plan is the fact that we possess two farms instead of one, the distance away two miles and a half, and the fact that we are obliged to cart supplies from the main institution. We shall probably not in the immediate future enlarge the colony unless we are able to construct an electric railway between our main asylum and that, in which event other cottages would probably be erected to make room for the growth of our district."

The hospital at Morganton is full to overflowing. I believe the female department is the worst crowded institution in the country. The insane women of our district are knocking at our doors in vain. The directors have by rare economy and thrift saved a small amount of money with which they are erecting a building for women. Even when this is finished the demand for room will not have been supplied. The institution at Raleigh is also building room for a hundred or more. The one at Goldsboro has just finished a large addition, sufficient at least for some time to come, which is a wise and proper policy, for the sick negro has no home, and is a charge upon the county. The State has furnished her colored insane with accommodation; should she do less for her white people?

The Board of Health deserves the hearty thanks of the friends of the insane everywhere for using all its power to further their material interest. The work the board gave me has been a work of love, for no one knows better the suffering these unfortunate and helpless people undergo, and no one would labor harder to relieve them.

Gentlemen, my task is done in the best manner I could in the time allotted me. Let us all hope that, imperfect as it is, it will draw public attention to these afflicted and suffering human beings, and that relief will speedily follow.

## THE EFFECTS OF ALCOHOLIC BEVERAGES.

BY DR. S. WESTRAY BATTLE, U. S. N., OF ASHEVILLE.

(Read at the Charlotte Health Conference.)

Ladies and Gentlemen: I am not here to deliver a temperance lecture, though I have but little doubt that there are those among you who will feel when I shall have finished that my talk has been in effect tantamount to that sort of a discourse: nor indeed shall I be sorry if it proves productive of good in calling attention to a subject so important to us all.

My reasons for choosing the subject, "The Effects of Alcoholic Beverages," are two-fold:

First, because it is one of universal interest, and has engaged the attention of some of the best thinkers on hygiene since the beginning of civilization.

Again, I am impelled to the consideration of this important subject, through a sense of duty as a member of the Board of Health of North Carolina, to do what I can in my feeble way to disseminate a more general knowledge on a matter so germane to the public health.

I shall endeavor to confine myself to the rational or scientific consideration of the effect of alcoholic beverages in health, and when used in excess, that we may all of us know just how necessary or unnecessary they may be to us in dietetics. The moral side of the question I shall leave to others who can more appropriately do justice to the subject: though I cannot but just mention in passing that it has been stated, and I believe truly so, that if alcohol were unknown one half of the sin and a large part of the poverty and unhappiness of the world would disappear.

Although intensely personal to myself, I will mention how curiously I was led into a choice of this subject. Not many days ago my friend, Dr. Lewis, Secretary of the Board, and myself were in correspondence concerning some health matters, when I had occasion to say that I was not up to much, and was fearful lest I was in for my annual gouty attack. I perhaps had a sneaking notion, too, that making such an announcement to my friend would rather excuse me from any active participation in the proceedings of the Board of Health here. But not so: I got no such encouragement. In due course of mail there came along a letter from the good doctor, full of commiseration for me, but winding up with a parting injunction somewhat to this effect: "Take to horseback as you did last winter, old-fashioned country doctor



style : keep good hours : don't work too hard : and be chary of your beer : I count upon you at Charlotte : let me know the title of your paper." So there is gout, beer, paper at Charlotte. And so it occurred to me, though I have not the slightest idea the amount of beer I consume has anything to do with my gouty ailments, I may err on this point, as we are ever prone to excuse ourselves, perceiving with great clearness the mote in our brother's eye, while we look through, around and by the great beam in our own : still, as I say, it occurred to me that such a topic was one of interest, and I would endeavor to present the subject as well as I could in the space of time allotted to me, and show the good doctor I was not afraid of handling the subject without gloves.

I shall divide my subject into a brief consideration of the different kinds of alcoholic beverages : the physiological action of alcohol : its influence on the various organs, and as an article of diet in health.

#### I.—BEER.

So we will return to the matter in hand, and for the purpose of convenience classify the alcoholic beverages under the heads of beer, wine and spirits.

Beer, as you all probably know, consists of malt and hop extracts, alcohol formed by fermentation, and salts added in the water used, or present in the malt and hops. The specific gravity varies from 1.006 to 1.039, and even more in the thick German beers. Simple lager beer has a specific gravity of 1.016 as compared with water, which we call 1.000; so you observe it is but little heavier than water and contains about 5 per cent. of alcohol, though this varies from 1 to 9 and 10 per cent. with the different kinds of beer. The malt, which is in the form of extract in beer, is from 4 to 15 per cent. It is least in the bitter and highest in the sweet beers and ales. The hop extract is in much smaller quantity. Beer also contains some free acid and a small amount of sugar.

#### II.—WINES.

The composition of wine is so various that it is difficult to give a summary. The chief ingredients are :

1. Alcohol from 16 to 25 per cent. It has been stated that the fermentation of grapes, when properly done, cannot yield more than 17 per cent of alcohol, and that any amount over and above this is added.

Port wine, 16 to 23 per cent.

Sherry, 16 to 25 per cent.

Maderia, 16 to 22 per cent.

Marsala, 15 to 25 per cent.

Bordeaux red, Chateau Lafitte, Margeau La Rose, Barsac, St. Emilion, St. Estephe, etc., 7 to 13.

Bordeaux white, Sauterne, Barsac, etc., 11 to 18.

Rhine wines, Johannisburgh, Hochheimer, Rudesheimer, etc., 7 to 16.

Champagnes, 8 to 13, and so on.

We readily see from the above how the amount of alcohol in wine varies, even from the same district.

To tell how much alcohol is consumed in any given quantity of wine or beer, measure the bottle in ounces and multiply it by the percentage of alcohol, with the decimal point before it. For example: A pint bottle of beer is supposed to contain 16 ounces. I don't know a single brewing establishment, by the way, that gives an honest pint: their so-called pint bottles hold anywhere from 11 to 15 ounces, but for illustration we will take it at 16 ounces. We have stated the quantity of alcohol in beer at 4 per cent. Now multiply 16 by .04 and we have as a result .64 of an ounce, rather more than one-half ounce of absolute alcohol, equivalent to two tablespoonfuls of whisky, which we will see contains about 50 per cent. of alcohol. In other words, a bottle of beer is in alcoholic potency about the same as an ordinary drink of whisky.

2. Ethers. A number of ethers enter into the composition of wine. It is stated that there are 25, or even more, of these compound ethers in wine, as oenanthyllic, malic, citric, tartaric, etc. The "bouquet" of wine is due to these compound ethers, especially nanthyllic, and remains as long as the wine is sound, becoming more pronounced as the wine ages.

3. Other ingredients are sugar, free acids, a small amount of fat, coloring matter and salts, 1 to 3 per cent. The specific gravity of wines depends upon the amount of alcohol and solids, and varies from 975 to 1050.

### III.—SPIRITS.

These contain the largest quantity of alcohol of all the alcoholic beverages. They are made by distilling fermented grapes (brandy), fermented molasses (rum), fermented malt or malt and grain and other materials (whisky). The quantity of alcohol varies from 50 to 60 per cent.

Brandy contains, besides alcohol, a number of the compound ethers already spoken of, coloring matter of the cask or caramel; tannins are also present. Perhaps it is not generally known that all spirits are colorless when fresh from the still. Burnt sugar or

caramel is largely used, I believe, to give proper color, which also seems to carry along with it the idea of age and a certain mellow-ness. Irish and Scotch whiskies derive a peculiar flavor from the malt or other material being dried over peat fires, or by the direct impregnation of peat smoke.

Gin is only alcohol diluted, with a little oil of juniper and other flavorings, and sweetening agents added. The specific gravity varies with the amount of alcohol, ranging from 930 as low as 870.

It may be interesting to give the names of some of the distilled spirits used in different parts of the world.

Hindoos, Malays, etc., use Arrack, Rice-Areca nut.

Greeks and Turks, Raki and Mastic, Rice-grape skin.

Hindoos, Toddy, Cocconut.

Chinese, Samshoo, Rice.

Japanese, Sacie.

Pacific Islanders, Kava or Kawa, Macropiper.

Mexicans, Pulque, Agave.

South American, Chica, Maize.

Russians and Poles, Vodki, Potato.

Abyssinians, Tallah, Miller.

Tartars, Koumiss, Mare's Milk.

The physiological action of the alcoholic beverage differs from that of pure alcohol, as they contain bodies besides alcohol, as we have seen, which have a certain physiological action of their own, and great distinction must be made between the effects of alcohol taken in dietetic doses and the effect when taken in excess. Beer has an action of its own, probably due to the active principles of the hops, lupulin, used in its manufacture. In small quantities it is soporific; and taken in large quantities it becomes noticeably depressing in its action, probably from the lupulin mentioned, which is the active principle of hops, a narcotic of medium potency. When beer is taken daily in excess, or even moderately for a long period, it leads to plethora or a deposit of fat by lessening the oxidation or tissue changes in the body; hence come many of the anomalous affections classed as gouty, against which our esteemed secretary was advising me. The question, "What is excess?" is not easy to answer, and will depend both on the composition of the beer and the habits of life of those who take it; but judging from the amount of alcohol which is allowable, (within the health limit,) from one to two pints of beer is sufficient for a healthy man per day.

Now, then, let us run over the effects of alcohol. The effects of the alcoholic beverages upon the human system in health will be better appreciated by a consideration of the physiological effects of alcohol, their most important constituent.

On the stomach: When taken into the stomach, alcohol is absorbed with little or no alteration, at once passing into the blood and then throughout the body. Its presence may be detected in almost any organ of the body soon after it is taken. Its effect on the stomach is pronounced; in small quantities it aids digestion, though some stomachs are intolerant of it in any form. In larger quantities digestion is retarded, the mucous membrane is reddened and a condition of chronic catarrh is produced—among the early indications of which may be mentioned morning cough, retching or “gagging,” nausea being easily provoked: continued, it causes an increase in the connective tissue between the glands, and finally a degeneration and obliteration of these parts, when stomach digestion is destroyed.

On the liver: In large quantities taken daily, it increases the size of this organ, by increasing the connective tissue till the very growth of the latter so encroaches on the glandular structure that it is destroyed, the capsule of Glisson shrinks, the organ becoming smaller, and there results a condition of the organ variously called “gin liver,” “tooper’s liver,” and “hob-nail liver,” the last-named from the irregularities brought about by the shrinking process. When this takes place health is gone. The integrity of the organ is compromised, never to be restored.

On the lungs: In large quantities, habitually taken, the effect is perhaps less noticeable on the lungs than many of the other organs of the body, though bronchial catarrhs and emphysema are common in those who take much alcohol.

On the heart and blood vessels: It undoubtedly increases the force and quickness of the heart’s action. Dr. Edmund A. Parkes, of London, a distinguished writer on hygiene, and to whom I am indebted for much of the subject matter of this paper, found that brandy augmented the rapidity of the pulse 13 per cent., and that the force was also increased; going further, he found, taking the usual estimate of the heart’s work, its daily excess of work with 4.8 fluid ounces of absolute alcohol was equal to a force that could lift 15.8 tons one foot high.

It causes dilatation of the superficial vessels, as shown by the redness and flushing of the skin. Authorities differ as to whether alcohol lowers the temperature in health or not, but the influence must be inconsiderable. In some cases of fever there is little doubt that it does lower the temperature, especially with children, and perhaps in health, when given in medium doses, it may lower the temperature by dilating the superficial vessels, whereby more blood comes to the surface, and thus more heat is lost by radiation and the increased perspiration. It most assuredly lowers the natural resistance of the body against cold—hence stimulants should be taken

at the end of an exposure rather than in the beginning or middle. When exposed for a long period to intense cold a drink may give one a feeling of comfort and exhilaration, but the power of resistance is lessened, and many instances are recorded where death has occurred, under such conditions, during sleep.

On the nervous system: On most persons it acts at once as an anæsthetic, blunting the sensibilities, lessening the rapidity of impressions, the power of thought and the perfection of the senses. In other cases it causes increased rapidity of thought and excites the imagination, but even here the power of control over a train of thought is lessened. There is no question that several brain diseases, including some cases of insanity, are caused by the excessive use of alcohol. Degenerative changes in the various organs of the body result from the immoderate use of alcohol, and the latter has aptly been called the very "genius of degeneration;" nor are these degenerations confined to the notoriously intemperate. As Dr. Parkes says: "I have seen them in women accustomed to take wine in quantities not excessive, and who would have been shocked at the imputation that they were taking too much although the result proved that for them it was excess." To some individuals alcohol in every shape or form is a poison, not necessarily producing intoxication, but causing sooner or later those degenerative changes which appear to be in all cases the same, fatty and fibroid.

Dietetic use: Is alcohol desirable as an article of diet in health? No hard and fast rule can be laid down on this point, and no satisfactory answer can be given with our present knowledge. There comes in the question of environment, the poverty or ease, the hard mental or bodily labor which may surround healthy individuals, hence the value or the want of value of a comparison of the health of the teetotaler with those who use alcohol in moderation. There are individuals in both classes enjoying the maximum of health and the greatest vigor of mind and body. There are arguments for and against the utility of alcohol in health. One of the chief arguments brought forth to sustain the utility of alcohol is the almost universal use of it among the civilized nations of the earth. Dr. Parkes is fair and broad-minded, and after an exhaustive discussion of the question arrives at the following conclusions: "The facts now stated make it difficult to avoid the conclusion that the dietetic value of alcohol has been much overrated. It does not appear to me possible at present to condemn alcohol altogether as an article of diet in health; or to prove that it is invariably hurtful, as some have attempted to do. It produces effects which are often useful in disease and sometimes desirable in health, but in health it is certainly not a necessity, and many persons are much better

without it. As now used by mankind, it is infinitely more powerful for evil than for good; though it can hardly be imagined that its dietetic use will cease in our time, yet a clearer view of its effects must surely lead to a lessening of the excessive use which now prevails. As a matter of public health, it is most important that the medical profession should throw its great influence into the scale of moderation; should explain the limit of the useful power, and show how easily the line is passed, which carries us from the region of safety into danger, when alcohol is taken as a common article of food."

If alcohol is useful, it is obviously important to determine just when the limit of usefulness is reached. Experiments have not been numerous, but fairly accurate on this point. Dr. Parkes says Dr. Anstie found that one fluid ounce and a half caused the appearance of alcohol in the urine, which he regarded as a sign that as much had been taken as could be disposed of in the body. The experiments of Dr. Parker himself and those of Count Wollowicz corroborated this result. In terms of the alcoholic beverage this would mean, giving the outside limit as one and one-half ounces of absolute alcohol, that this quantity would be equivalent to three fluid ounces of brandy (50 per cent.); seven and one-half ounces of sherry (20 per cent. of alcohol); or 30 ounces of beer (5 per cent. of alcohol); and Dr. Parkes says: "I believe that this standard is fairly correct, since from inquiry of many healthy men who take alcohol in moderation I find that they seldom exceed the above amount." There is no doubt that the greater part of the abuse of alcohol to-day arises from the pernicious habit of treating. You have treated me, so I must in turn, before we separate, treat you. American ways are good enough generally, but there is a viciousness in this, the like of which would be hard to find anywhere; nor has the custom the underlying principle of true politeness, from which in its inception nothing was further than the imposing of an obligation.

Allah be praised! the custom is on the wane. Likewise the general hard drinking of a few years ago.

The passing of the morning cocktail, or ante prandial toddy, is also to be noted with loud praise. I am informed on good authority that drinking of spirits in the clubs of New York city has notably decreased of late years, beers and wines of moderate alcoholic power taking their place largely. In France, where water seems to have been relegated to the bath-room and kitchen, and the light wines, especially the light red wines, are drunk to a surprising degree, drunkenness is far from common; indeed, it is a rare thing to see an intoxicated person. It is always better, even with the lighter alcoholics, to take them with the meal. We are creatures of habit.

## THE INFECTIOUSNESS OF MILK.

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BY RICHARD H. LEWIS, M. D., SECRETARY OF THE BOARD.

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(Read at the Charlotte Health Conference.)

Of all food products milk is the only one which is absolutely essential to the life of man. In the economy of nature it is his sole support in the most critical period of his existence, *i. e.*, at its beginning, when his vital machinery is most easily thrown out of balance. But while it is indispensable in infancy, it also occupies a most important place in man's dietary through life, particularly with children and invalids, and very properly, for it is the only single article of diet that is a complete food in itself. If it can be shown, therefore, that it is frequently the carrier of disease it is easy to understand and appreciate the tremendous importance of the subject we have under consideration.

Before taking up the subject proper it would, perhaps, not be amiss to consider for a moment what we mean by the "infectiousness of milk." The word "infect" is derived from the Latin "*inficere*, to put in, or corrupt," and means "to communicate or transmit the specific virus or germs of disease." It goes without saying that pure milk in itself is not infectious. We mean by the infectiousness of milk that it is the medium of transmission to man of the specific virus, or germs of disease, when itself becomes contaminated therewith. And it constitutes a most excellent medium for such transmission because it is a rich "culture medium," as the bacteriologists say, for the growth of the various germs which cause disease. The object of our inquiry, therefore, will be,

1. How these disease-producing germs get into milk, and the best way to prevent it, and
2. Not being able to prevent their entrance into the milk, the best way of killing them and at the same time leave the milk in good condition as a food.

In the limited time at my disposal I can treat the subject only in the most general way, and must omit a great mass of extremely interesting observations which have been recorded, but I will try to be as clear and practical as possible.

We will first consider what may be called the general infection of milk as contradistinguished from the specific—its contamination with pure filth, so to speak, in which there is no specific disease germ. Every housekeeper in this audience has observed, at one time or another, in pouring out milk which has been standing

some time in a pan or pitcher, a dark sediment at the bottom. This sediment is composed of several ingredients, but it is chiefly particles of manure which have fallen into the milk-pail from the udder, teats and flank of a dirty cow. Although this filth will not cause any particular disease of itself, it assists in the development in the milk, under certain conditions, of most virulent poisons by supplying more food for the bacteria, which generate the poisons to feed on.

*Diseased cows* may transmit through their milk diseases of various forms, not the specific disease with which they are suffering, but certain "upsettings" of the human constitution. This is especially the case when the seat of the disease is the udder. The most common of these diseases is what is called garget, or inflammation of the bag, in which the milk becomes lumpy, stringy and mixed with pus or "matter." As bearing on this point, and illustrating to what extent the scientific enthusiasm of some men will carry them, I will give one instance. A Dr. Brush produced artificially a case of garget by bruising one-quarter of the udder of his cow. The milk from this quarter was of the character above mentioned and alkaline, while that from the other three-quarters was apparently healthy and acid. After four days, he gave his own child, 16 months old, four ounces of this acid but otherwise normal appearing milk, at 5 o'clock P. M. The child fell asleep, but in two hours awakened crying, apparently with stomach ache, and was kept awake till past midnight, during which time a large amount of acid was voided per rectum. The next day the bowels were slightly disturbed, and the doctor asks, "What would be the condition of the child had it been fed continuously on such milk?"

*Improper feeding* will also produce such changes in the milk as to disorder the digestive apparatus of infants. It is a fact well known to mothers that too free an indulgence in fruit and vegetables on their part will often upset the nursing babe. And so it is with the milk of cows feeding on certain weeds, cabbage, turnip tops, swill, or other fermented food. The very interesting and mysterious disease known as milk-sickness or "the trembles," which is met with in our own mountains, is supposed by some to be caused by cows eating poison-oak, though it has not yet been demonstrated. Whatever the cause of this disease may be, it seems to exist in certain circumscribed localities, which are known in some instances and kept fenced off from the pastures. I would refer those interested in this subject to a valuable paper by Dr. J. Howell Way, of Waynesville, the intelligent and efficient Superintendent of Health of Haywood county.



The *specific diseases* transmitted through milk are typhoid fever, diphtheria, scarlet fever, tuberculosis, or consumption, and cholera.

That *typhoid fever* is communicated to man by means of infected milk has been thoroughly demonstrated. A sudden outbreak of the disease among those obtaining their milk from the same dairy has suggested that as the cause, and investigation has shown the contamination. As many as 138 epidemics of milk-typhoid have been tabulated. The cow does not convey the germ to the milk herself, except possibly by drinking, or more likely wading in polluted water and infecting the udder, but the poison is introduced after the milk is drawn. This may be done by the infected hands of a milker who has been nursing a case of typhoid, or who has a "walking" case himself, but generally it is by washing the utensils, or deliberately watering the milk with infected water—typhoid fever being almost invariably a water-borne disease.

The *diphtheria* and *scarlet fever* poison is also usually introduced into the milk from the outside, the disease prevailing in the families of the dairymen or others who handle the milk, but there is evidence to support the view that they are sometimes attributable to the milk of cows having inflammatory or ulcerative affections of the udder. In such affections the presence of certain microbes known as streptococci and staphylococci has been demonstrated, and according to Drs. Bussey and Kober, there are many reasons for believing that some cases of diphtheria and scarlet fever, or diseases that cannot be clinically differentiated from them, are caused by infection with these cocci. It also seems to be a fact that the most malignant forms of diphtheria nearly always show this cocci infection as well as that with the specific diphtheria bacillus.

*Tuberculosis.* The mere statement of the established facts that one-seventh of all deaths are due to tuberculosis, and that cows are very subject to this disease, identical with that found in man, is sufficient to show the very great importance of studying the milk in this connection. To give you some idea of the prevalence of tuberculosis among cows, I will read a few statistics. In 1885, 15 per cent. of the cattle slaughtered at Leipsic were tubercular, at Stolp 20 per cent., Bromberg 26 per cent., while at Berlin the percentage was much higher. Of 67,077 cattle butchered at Leipsic during the years 1888-91, 20.4 were tubercular. In this country, Dr. Ernst, of Massachusetts, on the evidence of 39 veterinarians, representing 17 States and reporting on 3,000 cattle, gives 18 per cent. tubercular and 8 per cent. suspicious. Dr. DeSchweinitz, of our own State, now connected with the Bureau of Anima

Industry at Washington, says that in many cases from 50 to 70 per cent. of the dairy herds examined were found to be infected, and in one of these 50 per cent. had tuberculosis of the udder. The statistics of other countries show a similar state of affairs.

The presence of tubercle bacilli in milk was first demonstrated by Virchow and Koch in 1882, and their observations have since been confirmed by many bacteriologists. That the disease, generally in the slower forms, which are commonly spoken of as scrofula, is transmitted through the milk of tuberculous cows to children previously healthy and without hereditary taint has been conclusively shown by numerous investigators. Just a half-century ago, long before bacteria or bacilli were ever thought of in this connection, a wide-awake German professor, Dr. Klencke, of Leipsic, proved this fact by his observations on 16 previously healthy children who were fed on milk from four cows in the same dairy, all of which were affected with a "scrofulous-tuberculous" disease, as revealed by post-mortem examinations. The children all developed marked symptoms of scrofula very soon after beginning the use of this milk, and most of them showed signs of improvement on a change to healthy milk and recovered. While some hold that the milk is never infected unless there be local tubercular disease of the udder, there seems to be little doubt that it also occurs in cases of general tuberculosis, when there is no apparent involvement of the udder. But however that may be, there is no doubt about the fact that tuberculosis is communicated to man through the milk of diseased cows, and, remembering the terrible nature of the malady, that should be sufficient to put us on our guard.

As *cholera* is an exotic disease, fortunately rare in our country, it is only necessary to say that its method of transmission through milk is practically identical with that of typhoid fever.

In the transmission of these particular diseases that I have mentioned the milk acts merely as the vehicle for carrying the germs to the body. Having once obtained an entrance they fasten upon the tissue suitable for their development, as, for example, the typhoid fever germ on certain little glands in the small intestine, the tubercle bacillus on various tissues, though most commonly upon the lungs, and the diphtheria and scarlet fever germs upon the throat. They then reproduce themselves with great rapidity, elaborating in the process of growth each its particular toxin or poison, which is absorbed into the circulation and causes the symptoms characteristic of the disease. But there are other bacteria of many varieties, belonging to the general class which causes putrefaction in organic matter and which are found everywhere, that infect milk and elaborate therein certain virulent poisons.

Let me illustrate the manner in which this poison is developed by a familiar example. Everybody knows that if you leaven bread and keep it in a warm place it will rise, though everybody may not know why it rises. It is accomplished in this way: Yeast is a microscopic plant, and may be called a first cousin of the bacteria, which are also microscopic plants, oval in shape and about  $\frac{1}{100}$  of an inch in diameter. It propagates by budding. A little daughter cell comes out from the side of the mother-cell and, when large enough, so to speak, to take care of herself (which she becomes in an incredibly short time) she cuts loose from her parent and immediately proceeds to sprout daughters of her own. In this process of growth the saccharine substance upon which it feeds is separated into two different chemical elements—carbonic acid gas, or carbon dioxide as they call it nowadays, and alcohol. You “infect” your dough with the yeast germs, keep it warm so that they may develop the gas which in its effort to escape lightens the mass, and when it reaches the proper point put it in the oven. The heat of cooking kills the yeast germs, and there is no further development of gas—the bread has been “sterilized,” as we scientific men say. Just so it is with the bacteria we are now considering. They get into milk, which is the right kind of soil for them, as dough is for the yeast plant, that is allowed to remain warm enough for their growth, and by their development separate certain substances in the milk upon which they feed into other chemical elements that we know to be poisonous to man. One of these milk poisons has been discovered. In 1883-4 about 300 people were taken violently sick in Michigan from eating cheese, with vomiting, purging and great prostration—symptoms very much like those of cholera morbus—and the Board of Health of that State requested Dr. Victor C. Vaughan, the brilliant Professor of Hygiene and Physiological Chemistry in the University at Ann Arbor to investigate the matter. He did so, and found the cause to be a poison of bacteriological origin, though he did not succeed in settling upon the particular bacterium. He afterwards found the same poison in milk. Finding it first in cheese, he named it “tyrotoxicon” (cheese-poison.) Dr. Vaughan thinks this tyrotoxicon is the cause of cholera infantum and that other similar though less energetic poisons derived from other varieties of bacteria produce entero-colitis, the summer diarrhoea of infants. We know that these diseases only occur in summer, and that bacteria will not grow in a temperature under 60 degrees. It is these two diseases which cause such fearful mortality among children, particularly in our large cities, owing to the transportation of the milk long distances through the heat, thereby af-

fording favorable conditions for the development of these toxicogenic or poison-producing bacteria.

To give you some idea of this infant mortality I will impose a few more statistics upon you. According to the general mortuary reports, about 40 per cent. of all deaths occur under 5 years of age. That these deaths may reasonably be referred to milk as the cause, in a large proportion of the cases, is more than probable. The following analysis of the mortuary report of Chicago for the month of August, which does not materially differ from those of other large cities, supports this view. In a population of 1,750,000 the total deaths were 2,261. Of this number 1,087, or 48 per cent., were under 5 years of age, 757 under 1 year, and 330 between 1 and 5, while between 5 and 10, after they had passed the milk stage, there were only 65 deaths. Fifty-four per cent. of the deaths under 1 year were due to diarrhoeal diseases, 50 per cent. between 1 and 5, and only 3 per cent. between 5 and 10.

We now come to the practical part of our subject. How can we prevent these disease-producing germs from getting into our milk? Or, failing in that, how can we destroy them without seriously injuring the milk as a food?

In regard to the specific germs which cause consumption, typhoid fever, diphtheria and scarlet fever, it can only be done by thorough inspection and control of all dairies supplying milk to the public by municipal or other health authorities empowered by law to enforce the necessary rules. These rules may be briefly summarized under: Healthy cows, supplied with good food and pure water, perfect cleanliness of the hands of the milkers, of the udders of the cows, and of all milk utensils, and rigid abstention from contact with the milk at any point of all persons who have been exposed to infectious diseases. I regret to say that I am afraid that public sentiment in North Carolina is not yet sufficiently educated for this, but I hope that this progressive city will set the example.

When it comes to keeping the toxicogenic or poison-producing bacteria—those which cause cholera infantum and the summer diarrhoea of infants, with their dreadful mortality—out of the milk, it is practically impossible, for the reason that they are floating round everywhere. But if we cannot keep them out we can keep them in abeyance and prevent their forming the poisons which cause the diseases, and much more easily than we can secure obedience to the rules suggested for protection against the specific bacteria. You remember that these bacteria do not flourish in a temperature under 60 degrees, and that if they do not grow they will not produce the poison—that it is not the bacteria themselves but their toxins or poisons which are to be dreaded, and that

these are formed in the milk and not in the tissues of the body, as are the toxins of the specific germs. This being true, you will see at once that the whole thing is summed up in the one word, *coolness*. If milk is immediately cooled down to 60 degrees or lower, and kept there until used, there would be little necessity for apprehension of the poisoning of hand-fed babies. But unfortunately in this warm climate of ours, with the lack of ice and cold springs, this is not easily done, even by most individuals keeping their own cow, and, of course, it is still less feasible for dairies delivering milk to the public. So that it is always safest, in summer, to assume that the milk intended for infants, unless we are positively certain that its temperature has not at any time gone above 60, is infected, and to act accordingly. The question now is: How can we destroy the bacteria and prevent the formation of the poisons with the least possible injury to the food qualities of the milk?

This can be done by heat. Boiling the milk will effectually kill the bacteria, but a better plan is to sterilize it by steam in one of the sterilizers which can be gotten for you by any druggist for a small sum. Both of these methods, however, change the taste of the milk and somewhat impair its nutritive qualities, but as Dr. Vaughan forcibly says, "The risk in using unsterilized milk is too great, and the question with the parent or physician is not, 'Am I giving the child the best food,' but 'Am I giving it a poison?' The choice is easily made when the matter is looked at in this light." But the best method of rendering the milk safe is by what is known as Pasteurization, which is the application of just enough heat to kill the bacteria without altering the taste or the nutritive qualities of the milk to any very appreciable extent. It has been ascertained that exposure to a temperature of about 155 degrees for a half hour will practically sterilize milk. As soon as the Pasteurizing is finished the milk should be rapidly cooled and put in a refrigerator, or, in the absence of ice, kept in the coldest water available until used. I show you an excellent contrivance for the low temperature Pasteurization of milk, designed by Dr. Freeman, the pathologist to the Foundling Hospital and to St. Mary's Hospital for Children in New York, which can be easily operated, and can be bought for about \$3.

If you cannot get a Pasteurizer for any reason, you might sterilize the milk by this method after a crude fashion, which would certainly be better than nothing, in this way: Take a clean bottle that has been scalded, fill it with the milk, stop it loosely with raw cotton (germs cannot pass through cotton, as Tyndall proved), set it in a narrow high tin bucket, and fill this bucket up to the neck of the bottle with ordinary cool water, set this bucket with the top off in a larger tin bucket that has two inches of boiling

water at its bottom, put the top of the big bucket on at once and set it aside on a table out of a draught and let it stand for three-quarters of an hour. Then remove and set the small bucket in a tub of cold water, and change the water in the tub every fifteen minutes for three times, after which take the bottle out and put it away in the coolest place you have, taking care not to remove the cotton plug until the milk is needed for use. But it is much the best plan to get a Pasteurizer if you can.

Notwithstanding the necessarily hurried and incomplete treatment of the subject, I trust that I have shown to your satisfaction that four of our most dreaded diseases—tuberculosis, typhoid fever, scarlet fever and diphtheria—are sometimes transmitted to man through the instrumentality of milk: that milk often becomes poisonous for the want of the proper care in warm weather, and that this poisonous milk is the agency most responsible for “the slaughter of the innocents” which we witness every summer; and, finally, that it is of the greatest importance that you should spare no pains to guarantee the purity and safety of the milk furnished your families, more especially your little ones.

In conclusion, I desire to acknowledge my great indebtedness in the preparation of this paper to the very complete and admirable report on “Morbific and Infectious Milk” by Drs. Busey and Kober, published in the last report of the health officer of the District of Columbia; and to the most excellent article on “Diarrhoeal Diseases” by Dr. Vaughan in the “American Text-Book of the Diseases of Children.”









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